FEBRUARY
1958
VOLUME 7
NUMBER 2

Battelle Technical Review

IN THIS ISSUE:

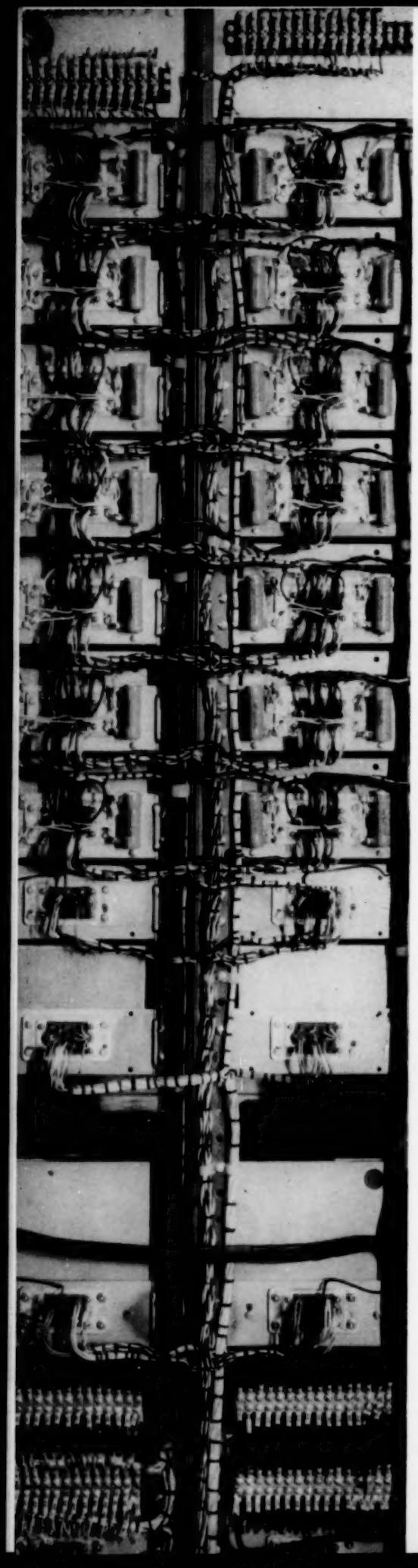
Simulation of Aeronautical High-Temperature Conditions

Volume 7, Number 2
February 1958

BATTELLE TECHNICAL REVIEW

Dedicated to the dissemination of knowledge. Published monthly by Battelle Memorial Institute, an endowed foundation serving mankind through science and technology.

Published monthly by Battelle Memorial Institute. Please address all correspondence about articles, abstracts, subscriptions and exchanges to: The Editor, Battelle Technical Review, Battelle Memorial Institute, 505 King Avenue, Columbus 1, Ohio. Accepted as controlled circulation publication at Columbus, Ohio. Printed in U. S. A.



CONTENTS

BATTELLE TECHNICAL REVIEW

1 Control of Irradiation Processes

2 Instrumentation Specialist

3 Simulation of Aeronautical High-Temperature Conditions

by WILBUR A. SPRAKER, JR.

Because of the impossibility of gathering data on hypersonic bodies operating under extremely severe conditions, technologists are developing methods of simulating some of those conditions and of gaining information by analysis and extrapolation of data from simulated and other conditions.

7 Future of High-Temperature Metals

by CLARENCE H. LORIG

These "predictions' on future developments in metals resisting high temperatures were originally prepared for inclusion in a time vault to be opened 25 years hence. They are being published here because of their intrinsic value and interest.

9 Notes from Battelle

Reports on research activities and developments of interest to science and industry.

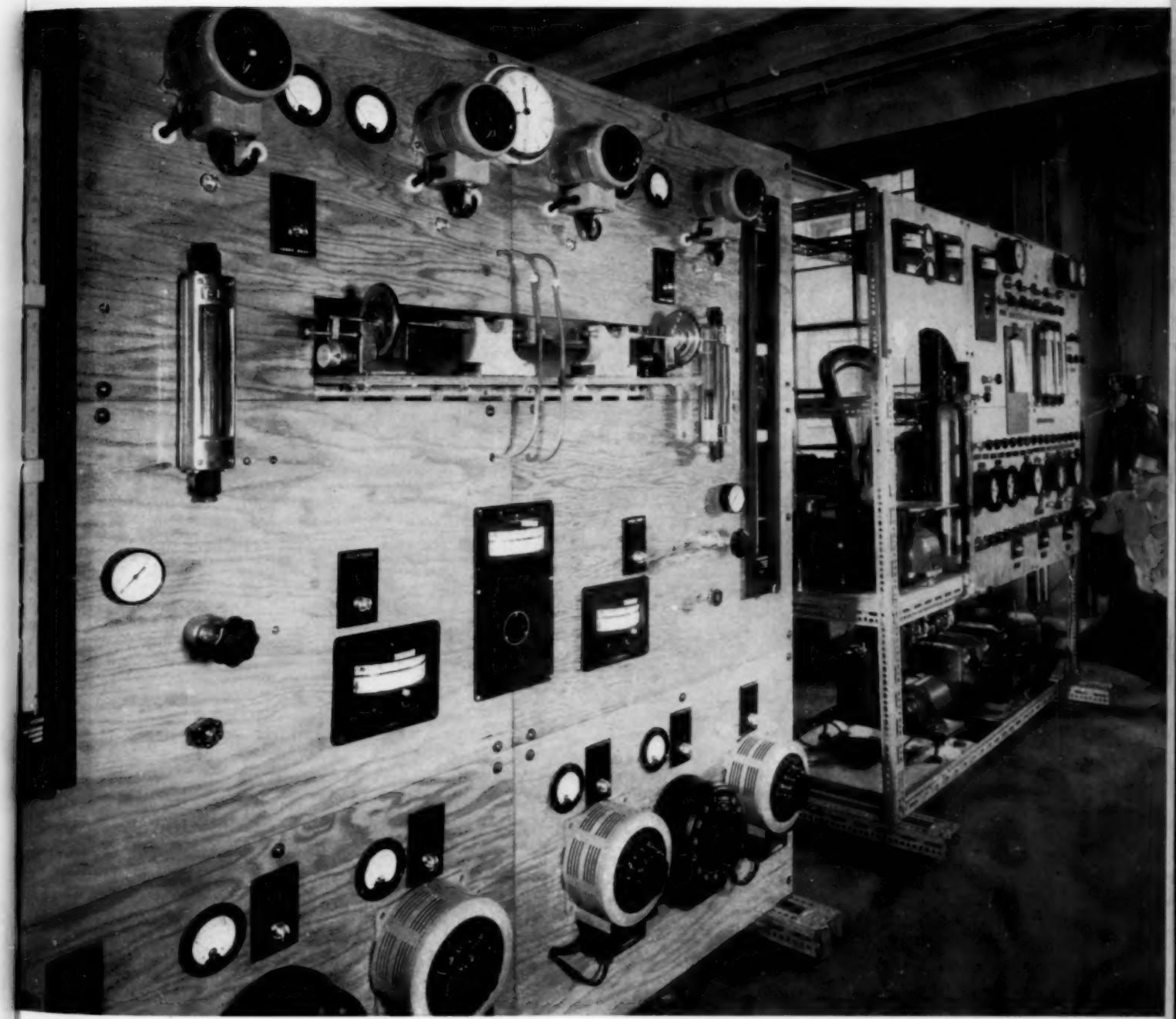
11 Writings by Staff Members

Papers and articles prepared by members of the Battelle staff that have appeared recently in books and periodicals.

77a Battelle Technical Review Abstracts

Abstracts of articles and papers in a wide variety of technological fields from more than 1350 journals published throughout the world. Abstract selection largely reflects primary areas of Battelle research.

The irradiation of chemical materials in a continuing process requires highly specialized equipment. The panels shown here contain pumps and metering equipment along with pressure and temperature control instrumentation for use with fluids to be irradiated in a continuous reactor in a nuclear pile. The Battelle designed panels are being used in special exploratory studies.



CONTROL OF IRRADIATION PROCESSES

VIGNETTE

INSTRUMENTATION SPECIALIST

ORVAL LINEBRINK

When he recently assumed the directorship of the Division of Physical and Mechanical Measurement of the Instrument Society of America, Orval Linebrink undertook a responsibility for which he is well fitted. For more than 15 years he has been associated with the activities of Battelle's instrumentation laboratory. In that laboratory his responsibilities include research in the field of instrumentation as well as the directing of services that are supplied to all of the Institute's research divisions.

Orval has participated in varied studies involving instrumentation problems. These range from development of equipment for use in standardizing instruments to investigating the use of magnetic amplifier components in instrumentation control systems and special applications of instrumentation to precise temperature controls. His knowledge of instrumentation is also called upon in studies such as the measurement of the temperature of metals during spinning in metals-forming processes.

In his guidance of the Battelle instrumentation group, Orval's primary aim is to provide rapid, dependable service wherever instruments are needed. To this end he has pioneered practices now standard in all leading instrument laboratories. Under his guidance, periodic checks of all instruments, historical records showing calibration, performance, and repairs of all instruments, complete and detailed indexes of the Institute's instruments, and files on all types of available instruments early became established parts of Battelle's instrumentation service. Another important service supplied by the laboratory is the modification of existing instruments and the building of special ones to meet unusual research demands.

One of Orval's great interests is spreading the gospel of good instrumentation practice. Thus he has organized workshops for training technical personnel in the proper use of instrumentation. He pursues the same aims through articles and talks relating to various phases of instrumentation technology.

Orval entered his field accidentally. A dedicated teacher, he discovered his interest in instrumentation during a summer in Battelle's laboratory. However, his training at Ohio Wesleyan University, where he received a B.S. in physics and mathematics, and at the University of Michigan, which led to a M.S. in physics, provided an excellent preparation for his work in instrumentation.

At home, Orval is kept busy trying to keep abreast of a son in the university, a teen-age daughter, and a younger son. Nevertheless, he manages to find time to serve as chairman of his church's board of trustees. He admits that his home workshop gets little use these days.

Simulation of Aeronautical High-Temperature Conditions

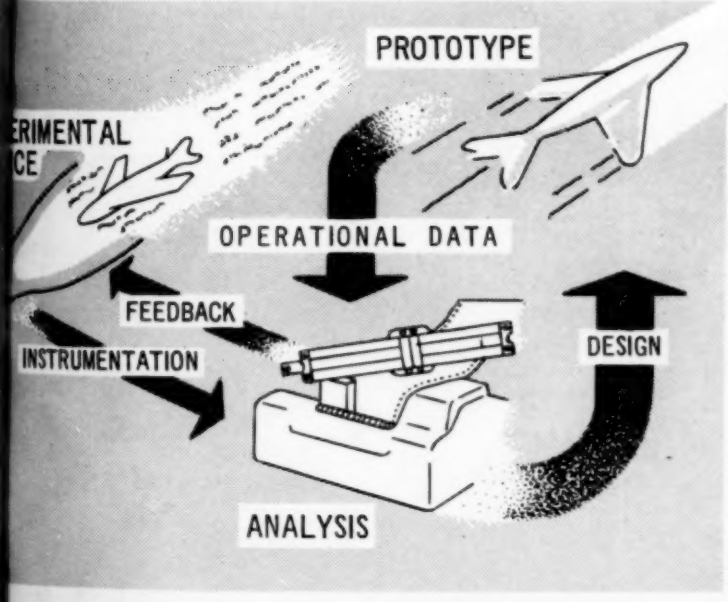
by WILBUR A. SPRAKER, JR.

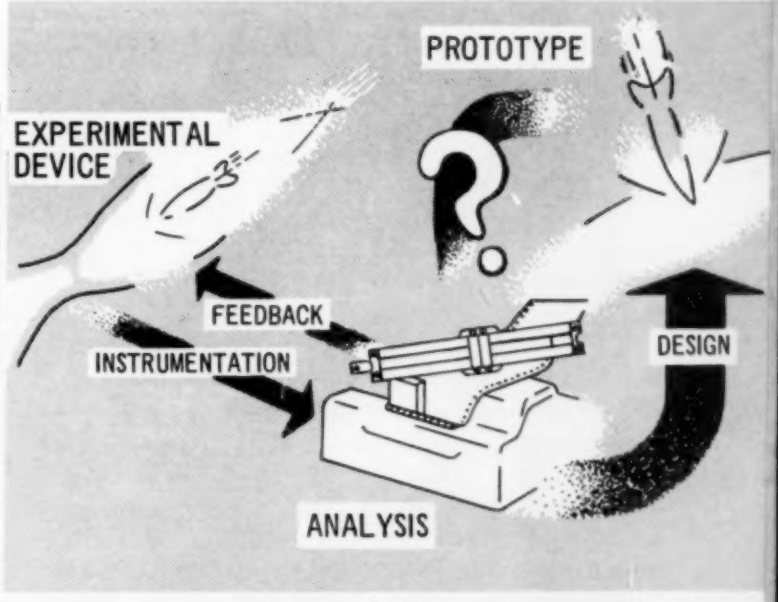
Because of the impossibility of gathering data on hypersonic bodies operating under extremely severe conditions, technologists are developing methods of simulating some of those conditions and of gaining information by analysis and extrapolation of data from simulated and other conditions.

THE ADVENT OF HIGH-PERFORMANCE missiles and aircraft has posed a multitude of materials engineering and application problems under conditions which are extremely severe when compared with previous experience. Not only are operating temperatures higher than in the past, but unusually-high heating rates and unique chemical-environmental conditions must also be considered. This combination of operating conditions has posed problems in the selection and utilization of materials to withstand these new conditions. These problems relate in many cases to the fact that exact simulation of desired operating conditions in the laboratory is beyond the present state-of-the-art of testing devices and facilities.

The needs for high-temperature testing devices can be broadly separated into two classes; those resulting from internal heating problems such as rocket engines and gas-turbine-engine afterburners, and those resulting from external heating, of which aerodynamic heating is the most important example. In addition to the problem of temperature, many present-day materials are subjected to high heating rates for such short periods of time that they never reach a steady-state thermal condition. Testing devices and instrumentation must therefore be able to provide and measure transient conditions.

The major variables which a testing device should simulate to meet present and anticipated operating





The problem of evaluating materials for high-temperature use is illustrated by the diagram on the right. In the usual situation, illustrated on the left, design is based upon data gained both from tests under simulated conditions and from the operation of prototypes. In designing for use of high-temperature materials, however, little data can be gained from prototypes because of the difficulty of obtaining information from a missile in flight. Therefore, design must be based primarily upon data gained from the study of a test device under simulated conditions.

conditions include temperature, heating rate, imposed forces, duration of conditions, and chemistry. Steady-state temperature may vary from 1600 F for a gas turbine to 5000 to 9000 F for rocket engines, and under transient conditions can reach as high as 20,000 F for the re-entrant portion of a long-range ballistic missile. Heating rates may vary from 2 Btu/ft² sec for a Mach 3 cruise missile at high altitudes to an estimated 5000 Btu/ft² sec for ballistic missile re-entry bodies. A simulation of imposed aerodynamic forces equivalent to Mach numbers of 3 to 20 at altitudes ranging from sea level to the edge of outer space may be necessary. These imposed forces include boundary-layer shearing forces, dynamic pressure, and pressure differences resulting from body shape and orientation. The required testing duration may vary from a few second in the case of some missiles and rockets motors to a matter of hours for airbreathing engines and cruise-missile airframes subjected to aerodynamic heating. Finally, the chemistry of the system may vary from dissociated and ionized air to a variety of propellant combustion products being discharged through a rocket nozzle.

A number of specialized high-temperature testing devices are available or in the process of development. Some of these are already in general use. Others are still only possibilities which are being investigated in various laboratories. Those now available are proving useful in evaluating materials being considered to meet the extreme operating conditions. However, a comparison of the limited conditions that can be simulated with these test facilities and the extreme requirements that are imposed on missiles and aircraft suggests the magnitude of the problem still facing the technologists in this field.

Available Devices

The following summaries present the testing devices already in use or under consideration and indicate both their limitations and the problems involved in their utilization.

1. *Quartz lamps.* Radiant heating from high-intensity quartz lamps can produce temperatures up to 2500 F and heating rates sufficient to simulate structural operating conditions of supersonic aircraft and missiles.

2. *Electric arcs.* The tail flame of high-intensity electric arcs can produce temperatures of over 10,000 F with high heating rates. However, the gas velocity is low and the chemistry of the system is much different from that of air.

3. *Plasma jets.* A flow of water or gas through an electric arc produces a stream of dissociated and ionized particles called plasma. Temperatures of over 20,000 F are theoretically possible with heating rates of 2000 Btu/ft² sec. However, the exhaust Mach number is low, and details of the chemistry of the system are still uncertain.

4. *Rocket motors.* Small-scale rocket motors can be used to test materials for rocket-motor applications with an almost exact simulation of operating conditions. Rocket motors are also useful for testing missile materials under erosion and oxidation conditions. Temperatures of 5000 to 8500 F are possible with available propellant combinations, and heating rates of up to 3000 Btu/ft² sec can be obtained. The chemistry of the exhaust gases, however, is different from that of air, and specimens are usually limited in size.

5. *Shock tubes and tunnels.* An explosion wave produced in a shock tube or tunnel can simulate hypersonic flows, including temperatures and chemical characteristics, to good accuracy. Testing durations, however, are limited to microseconds.

6. *Solar furnaces.* Temperatures of up to 6000 F and heating rates approaching 2000 Btu/ft² sec can be provided by solar furnaces. Specimen size is limited by the size of available reflectors, and the ability to provide gas-velocity effects to simulate aerodynamically imposed forces is meager.

7. *Heated wind tunnels.* This is one of the few types of facilities that can simulate all of the free-flight parameters closely. At the same time, it is also the most expensive device. At present, such tunnels are limited to temperatures of approximately 4000 F and to Mach numbers of 10 to 15.

8. *Pressurized ballistic ranges.* Free-flight conditions can be simulated closely by firing projectiles from

The author has been associated with the study of problems relating to heat transfer, fluid mechanics, and thermodynamics in aircraft propulsion and to industrial fluid mechanics systems. He brought to Battelle a background of experience gained in various areas of the aircraft industry. As senior propulsion engineer at Convair Division of General Dynamics Corporation, Fort Worth, he was associated with studies of propulsion performance. He was concerned with research in the fluid dynamic design of nuclear reactors and the adaptation of gasturbine power plants to nuclear power at the N.E.P.A. Division of Fairchild Engine and Airplane Company at Oak Ridge. Earlier, Spraker had participated in the design and development of axial-flow compressors at Pratt & Whitney Aircraft.

special hypervelocity guns down a pressurized ballistic range. The value of such ranges is limited because of the small size of the specimen that can be used and the short duration of the test.

9. *Particle accelerators.* Small particles, suspended and accelerated by electrostatic forces, can reach hypersonic velocities. A close approximation of free-flight conditions can be obtained with such devices, but considerable development is necessary before they can be utilized in materials studies.

10. *Nuclear blasts.* The blast from a nuclear explosion can be used to produce very high temperatures, heating rates, and velocities. However, such tests are of very short duration and test conditions are far from steady.

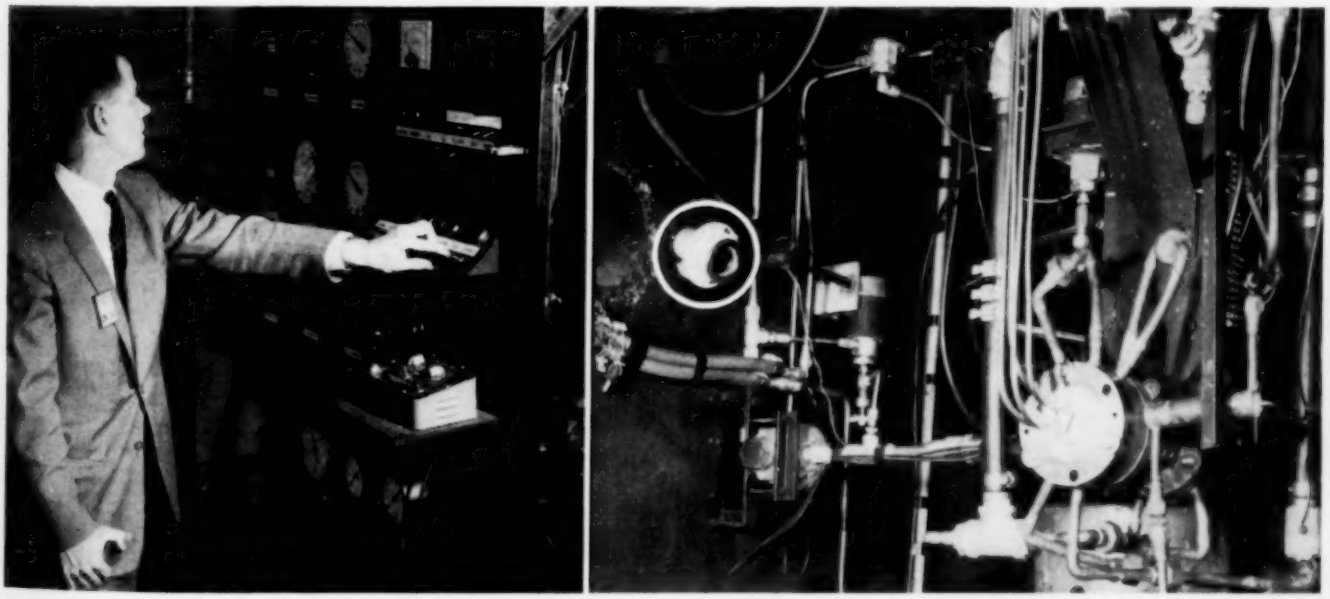
It can be seen from the above list that each of the testing devices is applicable to some area of materials testing. In the case of some of the less severe operating conditions, an adequate simulation can be obtained in the laboratory. However, the most severe conditions, of which ballistic missile re-entry body operating conditions are the prime example, have not been completely simulated.

The above discussion has not been presented to belabor the limitations that are faced by aeronautical development groups, but rather to put the problem into perspective. Technological development in the past has made use of combined laboratory simulation and operational testing to solve problems. Operating conditions are simulated in the laboratory and laboratory results are confirmed and modified by operating experience. In general, the greater the cost of operational testing, the greater the emphasis on laboratory research.

In the aircraft and missile field today, we are faced with a situation in which we cannot hope to simulate more than a part of the expected operational environment in the laboratory. On the other hand, each operational test may be a million dollar operation. We are, therefore, confronted with the problem of interpreting research results obtained under one set of conditions in terms of expected performance under other, and usually much more severe, conditions. Such an accomplishment requires that we know our testing environment thoroughly; have instrumentation to measure temperatures, heating rates, chemical changes, and velocities to useful accuracies; and develop analytical techniques that can be used to correlate and extrapolate the experimental results.

Attacking Problems Created by Limited Data

The chart shown on page three illustrates the present situation in the high-temperature field. It will be noted that there is no direct connection at this time between testing and operational experience. This picture is actually not quite that dim since telemetering techniques in many cases can allow a transfer of information to the ground during operational tests. However, telemetering itself presents a number of difficult problems, and test data obtained in this way



Equipment for measuring the high temperatures generated by rocket motors is shown in the photos. A total radiation pyrometer (shown in the circle) measures, through a quartz window, the amount of energy radiated from the test specimen, which is located in the throat of the rocket motor. The photo on the left shows the panel from which the pyrometer and the test rocket motor are controlled remotely. The temperatures are recorded automatically.

leaves much to be desired in terms of both quantity and quality. We are, therefore, forced to depend largely upon the extrapolation of laboratory test results to more severe operating conditions by analytical methods.

Analytical methods for describing the various thermodynamic, fluid dynamic, and chemical processes taking place have been developed to a high state of refinement. The limitation in this area appears to be the supply of reliable test data that will either confirm or suggest modifications in the analytical methods.

The supply of test data is restricted by the testing-device limitations described previously, and by the limitations of the instrumentation used to measure temperatures and heat fluxes. The very high temperature will melt the usual thermocouple instruments and radiation techniques, such as pyrometry and spectroscopy, must be used. The first of these is relatively adaptable, provided that the temperatures are not too high and that the emissivity of the specimen is known. It is also important that the test environment should not radiate or absorb radiant energy to too great an extent.

The spectrograph, developed to a high degree of refinement over a number of years, is useful in determining the composition of an unknown material at a known temperature. The present problem of the technologist, however, is the reverse of this situation; he is seeking to determine the unknown temperature of a material of known composition. The use of the spectrograph for high-temperature measurements is being studied intensively by a number of organizations and the state-of-the-art in this field can be expected to advance considerably during the next few years.

Requirements for high-temperature materials have led to the development of a number of promising new testing devices. These developments, in turn, have created a need for new instrumentation techniques. At the present time, instrumentation limitations prevent an evaluation of the testing environments. In almost all cases we know we have something, but we are not quite sure what it is. However, the research programs now in progress can be expected to answer many of these questions during the next few years. The test data obtained from these programs, and the analytical methods developed, will form the basis for a new field of high-temperature technology.

This field of very-high-temperature technology, now directed primarily toward problems associated with missiles and high-speed aircraft, can be expected to have an effect on other technological areas. It is difficult to prophesy these effects, but major advances in the chemical and metallurgical industries seem unlikely. The power-generating industry has long been restricted by the temperature limits of materials, and may be able to increase its operating temperatures with resulting operational economies. The study of interactions between materials and their environments may be expected also to lead to a better understanding of the behavior of materials. Such an understanding, in turn, may lead to new materials and hence to a better selection of materials at both high and low temperatures. The increase in allowable temperatures, and the technological changes resulting from this increase, may well lead to the very-high-temperature age in industry as well as in aeronautics.

"One might say that metallurgy changes from an art to a science when we begin to apply basic principles to the design of practices and to the interpretation of results. It is like comparing a political government ruled by the whims of a dictator to one ruled by law and order under a constitution. Basic laws are immutable and invariant, the same yesterday, today, and tomorrow. While this may sometimes result in frustration, as when we try to circumvent them, mostly it gives us confidence and assurance that if we are constant in using good practice, we will obtain consistently good results."

Clarence E. Sims, Battelle Memorial Institute, before 12th Annual Technical and Operating Conference, Steel Founders' Society of America

Future of High-Temperature Metals

These "predictions" on future developments in metals resisting high temperatures were originally prepared for inclusion in a time vault to be opened 25 years hence. They are being published here because of their intrinsic value and interest.

by CLARENCE H. LORIG

IN THE DEVELOPMENT OF materials for high-temperature load-bearing applications in heat engines, nuclear reactors, electronic components and other as yet unknown applications, the "boundary" between metals and ceramics will become much less distinct in the next 25 years. There will be a new intermediate family of materials based on intermetallic compounds. There will be further development of cermets, that is, bodies made up predominantly of small particles or fibers of refractory (ceramic type) materials held together with a ductile metal acting as a cement. On the other hand, research on the dispersion hardening of metals is leading to the development of predominantly metallic bodies in which hard refractory particles are dispersed. The next 25 years will see both approaches extended until we have a whole spectrum of metal-ceramic combination materials. In the purely metallic materials, there will be an increasing trend toward complex alloys in which no single element can be spoken of as the "base".

UTILIZING BRITTLE MATERIALS

The lack of ductility which presently hampers ceramic-type materials will be overcome partially by the achievement of limited ductility, but even more by learning to use and fabricate these more brittle materials, just as we have learned to use glass. In general, materials for the highest-temperature service will be harder and more brittle than our present high-temperature alloys.

One approach to the utilization of brittle materials will be to use them along with ductile metals in composite structures. These may take such forms as ceramic coated metals, metal reinforced ceramics and ceramic coatings, bodies made of metal wires or fibers held together and protected from oxidation by ceramic cements, metal-ceramic laminates, and the like. The metal components will impart shock resistance and room-temperature tensile strength, while the ceramic imparts creep strength and oxidation resistance. The "ceramic" parts of these composite structures may be cermets, intermetallic compounds, graphite, oxides, carbides, borides, nitrides, or other refractory substances. Metals used in these composites will depend on the operating temperature.

Molybdenum-, tungsten-, tantalum-, and columbium-, base alloys will be used, in appropriate temperature ranges, both in composite structures with ceramics and in all metal structures in which molybdenum and tungsten will be protected by metallic self-healing coatings or uncoated in a few instances where conditions are not oxidizing. Columbium- and/or tantalum-base alloys will be developed which are sufficiently oxidation resistant not to require protection. Of these metals, molybdenum will be the most highly developed and the most commonly used.

Some estimates of the temperature ranges in which various materials will find application are given in the accompanying table. Through the use of gas or liquid cooling, which will be common, it will be possible to use these materials in environments which are at temperatures higher than those indicated.

Probable Future Temperature Ranges of Materials

Material	*Temperature, F.*	*Remarks*
Tungsten-base and tantalum-base alloys	2700-3500	
Molybdenum-base alloys	2200-3000	
Columbium-base alloys	2000-2500	
Chromium-base alloys	To 2400	Limited to very low stresses above 2000 F
Complex alloys containing two or more of the above metals as a base	To 3000 +	
Nickel-base and cobalt-base alloys	To 1850	
Iron-base alloys	To 1700	
Iron-aluminum-base alloys	To 1400	
Titanium-base alloys	To 1200	To 1400 F for times up to 10 minutes or less
Beryllium-base alloys	To 1200	For special applications where light weight and high elastic modulus are important

The iron-aluminum-base materials will have the advantage of low cost and abundant raw materials; hence, considerable effort will be devoted to overcoming their lack of ductility and developing fabrication techniques. In view of its abundance there will probably be considerable effort toward using silicon as a major constituent for alloys for moderately high temperatures, but this will likely still be in the development stage 25 years from now. Both these classes of materials will be of great interest to the automotive industry.

Aluminum-coated low-alloy steels will be used for short-time low-stress applications up to 1200 or 1500 F.

For certain special applications where there is a need for resistance to electric sparking or arcing or resistance to the "water cycle" attack which plagues the use of tungsten in evacuated electronic tubes, rhenium alloys will find application. This will be limited to uses where high cost can be tolerated and a total supply of only a few tons annually is no handicap.

In many cases we will be using materials at far lower stresses than is now customary. Also, we will have some extremely short-time applications, and we will have learned to take the time factor into our design calculations in such a way as to utilize more nearly the full potentialities of the material considering its intended life.

To take full advantage of the properties of materials with high strength at elevated temperatures, honeycomb and sandwich-type structures and integrally stiffened sheet and plate will be brought to a high state of development. This will mean development of methods for making ultra-thin sheet and for welding and high-temperature brazing.

The predicted achievement of materials with improved ductility and elevated-temperature strength will have been based largely on better theoretical understanding of the solid state rather than the trial and error approach by which present high-temperature materials are developed.

As technical director, Dr. Lorig has long been responsible for much of Battelle's research in process metallurgy and foundry technology. In recent years, he has been closely associated with studies of many of the refractory or high-temperature melting metals. It was natural, therefore, for him to be selected to prepare the accompanying statement for use in connection with the dedication of the Elgin National Watch Company's new research center. Dr. Lorig received the Joseph S. Seaman Gold Medal Award from the American Foundry Society in 1950 for distinction in metallurgical research. The next year he delivered the Campbell Memorial Lecture before the American Society for Metals. He is currently Vice President of ASM.

NOTES from BATTELLE

NEW BATTELLE PRESIDENT

Dr. B. D. Thomas has been named to the presidency of Battelle Memorial Institute to succeed Dr. Clyde Williams, whose retirement as President was announced recently. Announcement of the new appointment was made by the Institute's Board of Trustees.

Active head of Battelle since being named Director a year ago, Dr. Thomas has been a member of the Battelle organization for many years. He joined the staff as a research engineer in 1934, was appointed assistant director in 1942, and vice president in 1955.

"The trustees of Battelle feel most fortunate that in Bert Thomas we have a proved administrator, as well as an outstanding scholar and scientist in his own right," commented Dr. Zay Jeffries, Board chairman. "In his 23 years at Battelle he has won the respect of his colleagues through his rare combination of analytical ability, scientific insight, and clear logic, coupled with a deep sense of human values. As the senior member of the team developed by Dr. Williams, much of what Battelle is today can be credited to his vision, leadership, and business sagacity."

Dr. Thomas' varied scientific interests are reflected in his report on "The Technology of Iron Ore" for the President's Materials Policy Commission (1951), his published papers in physical chemistry, and his papers and patents on methods of separating, sorting, and concentrating minerals.

He has also written and lectured extensively on research management and the philosophy of science and research. His most recent appearance was in December before the Subcommittee on Economic Stabilization of the Joint Economic Committee of Congress. He appeared there on invitation to discuss trends and outlook for technological progress.

Along with his scientific and technical activities, the new 54-year-old president has carried important administrative responsibilities for most of his 23 years at Battelle. He established and headed its first division of chemical research in 1939, and was a key figure in the establishment of Battelle's research laboratories in Frankfurt, Germany, and Geneva, Switzerland.

Dr. Thomas is a graduate of the University of Washington, (B. S., 1929; Ph.D., 1933), where he was awarded a duPont fellowship in chemistry. He is a member of Phi Lambda Upsilon and Sigma Xi, honorary chemistry and scientific research societies, respectively. Earlier this year he was granted the honorary degree of Doctor of Engineering by the Michigan College of Mining and Technology "in recognition of high attainments in engineering".

His professional affiliations include the American Chemical Society, the American Institute of Mining, Metallurgical and Petroleum Engineers, Gesellschaft Deutschen Chemiker (Germany), Societe de Chemie Industrielle (France), Society of the Chemical Industry (British), American Foundrymen's Society, Ohio Society of Professional Engineers and the Chemist's Club (N.Y.C.).

RESEARCH IN EUROPE

The emergence in Western Europe of a type of research center nonexistent outside the United States prior to World War II has been "welcomed" by European government and industry.

This was the conclusion reached by an American and a German scientist in their paper on "Contract Chemical Research in Europe", read before members of the American Institute of Chemical Engineers at its recent annual meeting. Dr. Frank C. Croxton, assistant director of Battelle Memorial Institute in Columbus, read the paper in behalf of his coauthor, Dr. M. A. W. Barnick, director of the Battelle laboratories in Frankfurt, Germany.

Centers which conduct scientific research on a contract basis were described in the paper. The authors traced the post-war development of these research centers in Western Europe against a background of growing research effort during the past decade.

"Since 1946, and especially since 1948, when currency reform occurred in Germany, the reconstruction of Europe's research effort has been rapid and effective," the authors said. Industry and government in West Germany are now spending an estimated one and one-quarter billion German Marks for research, "and this includes essentially no military investigations". This amounts to about one per cent of the national income, as compared with one and one-half per cent spent in the United States. The authors estimated research expenditures in the United Kingdom at about 1.8 per cent of the national income. "If

the American research level is satisfactory, it might be said that the levels in Germany and the United Kingdom are commendably high."

Newly established European facilities for carrying on industry-and government-supported research "are filling an important need of which European industry has rapidly become aware," according to the authors. The Battelle laboratories established in Frankfurt, Germany, and in Geneva, Switzerland, whose first sponsored research studies were started about four years ago, are now functioning without operating subsidy. As additional examples of new and successful research facilities of the same type in Europe, the writers cited Fulmer Research Institute and Sondes Place Research Institute in England.

Apart from the economic benefits from such research centers to individual industrial firms and ultimately to whole groups of people, the authors foresee still other advantages. They concluded: "... research institutes (in the United States) for many years have had an educational function as well as a research function. They have contributed to the wide-spread knowledge of scientific research in the United States. It is to be hoped that they will not only do this in Europe, but also will increase international understanding among scientists and engineers, . . . which should spread to others in this geographic area which is so different from the United States, but which is populated by people with such similar hopes and ambitions."

✱ ANALOG-DIGITAL DEVICE

Many computing problems present characteristics that appear to call for both digital- and analog-type computers. Such problems generally present difficulties for operators of small computing facilities since available analog-digital converters are generally expensive, highly specialized, or both. A device for resolving certain problems of this type, has been developed by Battelle systems engineering technologists. The class of problems covered is that which admits complete simulation within the capacity of the available analog computer, but whose results must be processed subsequently on a digital computer. Such digital processing involves the values of all the traces of the analog output at various points in time, not just a single final number.

The participating Battelle technologists—George H. Jenkinson, Benjamin B. Gordon, and Benjamin L. Schwartz—recently described the device, known as a "general-purpose relay programmer". It comprises a collection of relays, stepper switches, a digital voltmeter, connectors to an IBM card punch, and some miscellaneous additional components such as diodes and utility switches.

A distinctive feature of the programmer, which combines relatively low cost and ease of construction, is its removable plug board. The technologists report that no critical components are employed, and construction and maintenance are straightforward. They estimate that such a system would be practical for most computing installations comprised of a 20-amplifier analog and a small magnetic-drum digital computer.

✱ NEW VAPOR-PRESSURE STUDY

A new study was recently made at Battelle for the Atomic Energy Commission on the vapor pressure of beryllium fluoride over the temperature interval of 802 to 1025 C. The results agreed closely with previous data taken in studies of the 802 to 968 C range. While excessive scatter of vapor-pressure data in the lower temperature region prevented a melting-point determination of the material by the transpiration method alone, thermal analysis showed the melting point to be about 545 C.

Battelle chemists Karl A. Sense and Richard W. Stone who carried on the study, also measured the vapor pressures of the sodium fluoride-beryllium fluoride system over the range 509 to 1061 C. On the basis of previously developed theory, they concluded that the complex $NaBeF_3$ exists in the vapor phase in addition to sodium fluoride and beryllium fluoride. Resolution of the vapor phase on this basis indicated that still another complex might exist in the vapor phase.

✱ **Newly available literature** describes Battelle's research interests in a number of areas.

Research in Electronics and Electrical Engineering presents aspects of the Institute's interests and work in the fields of systems engineering, solid state physics and physical electronics, electronic reliability engineering, computational research, production processes for electronic components, instrumentation and control, and applied physics.

Research and Development in Mechanical Engineering includes brief presentations on the following areas of Battelle's research interests: vibration and acoustics, particle dynamics, heating and cooling, component and structural design, heat engines, materials engineering, fluid mechanics, and manufacturing engineering.

Copies of the above may be obtained from the Publications Office, Battelle Memorial Institute, 505 King Avenue, Columbus 1, Ohio.

Writings by STAFF Members

"Report of the High-Strength High-Temperature Materials for Standard Parts Symposium". Aircraft Industries Association 1957, contains the following papers by staff members:

Future Aircraft Requirements. S. A. Gordon, pp. 3-11.

Developments in the 55-year history of flight have based on power plant, aerodynamics, and structural analysis. Future problems are in the field of materials and structural design for strength at elevated temperatures. Research is needed to develop new materials and to determine the best weight compromise with materials presently available.

Titanium Alloys. W. Stuart Lyman, pp. 195-219.

Commercial titanium alloys, several unalloyed grades and at least ten alloy grades, are available for the manufacture of standard parts. Strength, physical properties, and corrosion resistance of these alloys have been studied, and their usefulness in standard parts to operate up to 800 F is assured. Heat treatment and further alloy development work can be expected to increase the useful range of applications for titanium. Maximum use temperature should increase possibly to 1,000 F or higher.

Engineering for the High Temperature Age of Flight. I-II. Frederick L. Bagby, et al. *Astronautics*, v. 12, August 1957, p. 50 + 6 pages; September 1957, pp. 46-51.

A new type of engineering technology involving close cooperation between the chemist, physicist, metallurgist, and aeronautical or missile engineer is needed to solve problems associated with the environments met by high-speed aircraft and missiles. Instruments for evaluating high temperature materials and pertinent data on various metals and alloys, ceramics and cermets, and plastics and rubbers are described.

Continuous-Recording Laboratory Thermobalance. E. S. Bartlett and D. N. Williams. *Review of Scientific Instruments*, v. 28, November 1957, pp. 919-921.

Instruments for continuous, automatic recording of weight change in laboratory tests were constructed. Sensitivity and accuracy permit transcription of weight change rates from 3 to 70 mg. per minute. Suggestions for instrument design for measurement of oxidation rates in the order of 0.1 mg. per hour are presented.

Future of Desiliconized Pig Iron for the Electric Furnace. S. L. Case. *Electric Furnace Steel Conference, 1956, Proceedings.* v. XIV. American Institute of Mining, Metallurgical, and Petroleum Engineers, 1957, pp. 295-299.

One of the important stumbling blocks in the comparative economics of open hearth and electric furnaces for production of low carbon steel is the high silicon content of the charge when the ratio of hot metal to scrap is one to one or higher. Each pound of silicon added to the furnace charge produces more than two pounds of lime to produce a slag of desirable characteristics; otherwise the economics of the electric furnace as a steel making unit compare very favorably with those of an open hearth.

A Radiation-Effects Program. J. E. Whitney, E. M. Chandler, J. E. Gates, and G. D. Calkins. Paper from *Symposium on Radiation Effects on Materials*, v. I., American Society for Testing Materials, 1957. pp. 27-39.

The various steps and procedures in a program for the study of the effects of radiation on nuclear fuels are discussed. These include inspection of the test specimens before irradiation, design of the radiation capsule, irradiation in a nuclear reactor, and inspection after irradiation. Equipment, facilities, costs, and some special problems are also considered.

Determination of Oxygen in Niobium. W. R. Hansen and M. W. Mallett. *Analytical Chemistry*, v. 29, December 1957, pp. 1868-1869.

Oxygen in Nb is determined by a diffusion-extraction method using conventional vacuum-fusion equipment. The mean deviation of analyses at the 0.019 weight per cent oxygen level is less than 0.001 weight per cent. The sensitivity of the analysis could be increased by increasing the sample size.

The Titanium-Sheet-Rolling Program. N. E. Promisel and William J. Harris, Jr. *Mechanical Engineering*, v. 79, December 1957, pp. 1112-1115.

A review of a program designed to develop optimum techniques for producing high-strength Ti alloys, to develop the design-engineering data required for their use in military equipment, and to enable manufacturers to evaluate production quantities of the sheet.

Experimental Welding With the Cone Arc. R. E. Monroe and D. C. Martin. *Welding Journal*, v. 36, December 1957, pp. 518-s-520-s.

Many of the electrical characteristics of the cone-arc welding process were studied during a program to develop welded molybdenum heat exchangers containing tube-to-header-joints. Production of uniform welds was primarily a function of even heat transfer around the weld periphery. A modified theory is presented to explain the cone-arc process.

Characterization of Sinterable Oxide Powders. I. BeO. J. F. Quirk, N. B. Mosley, and W. H. Duckworth. *American Ceramic Society, Journal*, v. 40, December, 1957.

Different BeO powders made from analyzed hydroxides showed a wide range of sinterability. The temperatures required for sintering the powder compacts to theoretical density ranged from 2300 to above 3200 F. Lattice parameters, thermal decomposition, surface areas, and refractive indices were determined on these powders after calcination in air at 750, 1470, 1830, and 2190 F. No simple relation between sinterability and these characteristics was found.

Development of a Thermal-Neutron Flux-Measuring Instrument. C. V. Weaver, C. K. Smith, and J. W. Chastain. *Communication and Electronics*, 1957, November. pp. 573-577.

Instrument measures thermal-neutron flux directly and automatically. Measurements are nearly independent of gamma flux and ambient temperature. Method depends upon balancing the temperatures of an electrically-heated balancing element and a fission-heated uranium-fueled sensing element.

Members of the Battelle staff are authors of the recently published articles and books listed on these pages. In most cases, reprints are available from the Battelle Publications Office, 505 King Avenue, Columbus 1, Ohio.

WORLD-WIDE ABSTRACTS

in the FIELDS *of*

77a Aeronautical Engineering
79a Agriculture
80a Biochemistry and Biophysics
83a Ceramics and Concrete
85a Chemical Engineering
86a Chemistry—Analytical
90a Chemistry—Inorganic and General
91a Chemistry—Organic
96a Chemistry—Physical
101a Coatings
103a Control Systems, Computers, and Systems Engineering
104a Electrical Engineering
106a Electrochemistry
107a Electronics
111a Engineering Economics
112a Fluid Mechanics
113a Food Technology
114a Fuels and Combustion
115a Geology, Geophysics, Mineralogy, and Mining Engineering
116a Graphic Arts
117a Heat Power
118a Information—Preparation and Dissemination
119a Instrumentation
120a Lubrication and Friction
121a Mechanical Engineering
122a Metallurgy
124a Metals—Corrosion
126a Metals—Extraction and Refining
128a Metals—Finishing, Polishing, and Cleaning
128a Metals—Foundry Practice
129a Metals—Heat Treatment
130a Metals—Mechanical and Physical Properties
134a Metals—Mechanical Working
135a Metals—Metallography, Transformations, and Structures
139a Metals—Powder
139a Nondestructive Testing and Quality Control
139a Nuclear Physics, Nucleonics, and Radiation
144a Operations Research and Management Engineering
144a Ore and Materials Beneficiation
145a Physics
147a Plastics
150a Pollution and Wastes
150a Rubber and Elastomers
151a Space Heating and Conditioning
152a Textiles, Fibers, Leather, and Paper
153a Welding and Joining
154a Miscellaneous

BATTELLE Technical Review ABSTRACTS

February 1958 Volume 7, Number 2

***Asterisks mark items that may be used in the Battelle Library only. None of the unbound materials listed below are available for interlibrary loan.**

AERONAUTICAL ENGINEERING

1552 Aids to Inertial Navigation. Frederick Stevens and Frank W. Lynch. *Aeronautical Engineering Review*, v. 16, Nov. 1957, p. 43-47.

Mechanical and natural limitations of inertial systems; methods to overcome these limitations; the problem of inertial platform misalignment; and methods for platform stabilization.

1553 (English.) **On the Influence of Wall Boundary Layers in Closed Transonic Test Sections.** Sune B. Berndt. *Aeronautical Research Institute of Sweden, Report* 71, 1957, 78 p. (TL504 F67m Vis.)

The reduction in wall interference caused by the wall boundary layers in the test section of a transonic wind tunnel is studied by means of small perturbation theory.

1554 An Analytical Investigation of Creep Under Combined Loadings. P. Narasimhamurthy. *Aircraft Engineering*, v. 29, Nov. 1957, p. 346-349.

Study of creep deflections in relation to aerodynamic heating.

1555* Engineering for the High Temperature Age of Flight. I-II. Frederick L. Bagby, et al. *Astronautics*, v. 12, Aug. 1957, p. 50 + 6 pages; Sept. 1957, p. 46-51.

A new type of engineering technology involving close cooperation between the chemist, physicist, metallurgist, and aeronautical or missile engineer is needed to solve problems associated with the environments met by high speed aircraft and missiles. Instruments for evaluating high temperature materials and pertinent data on various metals and alloys, ceramics and cermets, and plastics and rubbers are described.

1556 Wind Tunnel Instrumentation. A. Tiffany. *Electronic Engineering*, v. 29, Nov. 1957, p. 514-518.

Instrumentation requirements; special problems of measurement; application of digital techniques; operating experience.

1557 Automatic Damping Recorder for Wind Tunnel Application. Carl O. Olsson. *Institute of Radio Engineers, Transactions on Instrumentation*, v. I-6, Sept. 1957, p. 182-186. (TK1 In6.6i Vis.)

1558* (Russian.) Motion of a Wing With Finite Span at Supersonic Speeds. **Dvizhenie kryla konechnogo razmakha so sverkhzvukovoi skorost'iu.** S. Kadyrov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1957, no. 8, Aug., p. 35-40.

Theoretical solution of the problem of flow around the wing in the presence of a surface of strong discontinuity in the space.

1559 Recent Developments in Hypersonic Flow. Lester Lees. *Jet Propulsion*, v. 27, Nov. 1957, p. 1162-1178.

This paper is typical of eight articles comprising this issue on hyper-velocity flight. Other phases covered include long range performance, upper atmosphere characteristics, structural problems, heat transfer problems, use of lift for re-entry, and improved shock tube performance.

1560 Favorable Interference in Lifting Systems in Supersonic Flow. Antonio Ferri, Joseph H. Clarke, and Lu Ting. *Journal of the Aeronautical Sciences*, v. 24, Nov. 1957, p. 791-804.

Certain simple integral relations for the flow field of an elemental supersonic source are applied in the design and analysis of a number of lifting systems exhibiting favorable interference.

1561 Rotating Stall in Axial Flow Compressors. Jean Fabri and Raymond Siestrunck. *Journal of the Aeronautical Sciences*, v. 24, Nov. 1957, p. 805 + 8 pages.

The classical theories of linearized aerodynamics yield a complete description of the flow field to the rotating stall in a two-dimensional cascade of airfoils, when the extension of the stalled region is small. The corresponding physical scheme can be used for larger stalled regions, without the limitations of the linearizing assumptions, if no through flow is assumed through the stall zones.

1562 Diffraction of Disturbances Around a Convex Right Corner With Applications in Acousties and Wing-Body Interference. Lu Ting. *Journal of the Aeronautical Sciences*, v. 24, Nov. 1957, p. 821 + 10 pages.

Analysis of the flow field associated with the diffraction of a two-dimensional wave which comes in contact with a convex right-angled corner. Solutions obtained are applied to analysis of the equivalent steady flow problem of the flow field produced by the interference of wings and prismatic bodies of rectangular cross section.

1563 Transonic Flow With a Detached Bow Wave Past a Wedge Between Two Parallel Plane Walls. Shigeki Morioka. *Journal of the Aeronautical Sciences*, v. 24, Nov. 1957, p. 831-837.

1564 A Sensitive Aerodynamic Drag Balance as an Indicator of Low Air Speeds. J. F. Kemp. *Journal of Scientific Instruments*, v. 34, Oct. 1957, p. 411-415.

1565 Manned Rocket Aircraft. Frederick I. Ordway, III. *Missiles and Rockets*, v. 2, Nov. 1957, p. 71-78.

History and development of the pure rocket airplane.

1566 Realities of Space Travel. Selected Papers of the British Interplanetary Society. L. J. Carer, editor. 431 p. 1957. Putnam, London. (TL787 C24r)

Sixteen papers present known facts about travel in outer space, outline the problems still confronting man, and describe how these are slowly being solved.

1567* (French.) Local Determination of an Optimum Wing Under Supersonic Conditions. **Sur la détermination locale d'une aile optimum en régime supersonique.** P. Germain. *Recherche Aéronautique*, 1957, no. 60, Sept.-Oct., p. 3-12.

A method for theoretical determination of slopes of various wing profiles. Combined potential of the optimum wing.

1568 Materials for Aircraft Structures Subjected to Kinetic Heating. A. J. Murphy. *Royal Aeronautical Society, Journal*, v. 61, Oct. 1957, p. 653-666.

Temperature attained; materials available; structural efficiences at ordinary and elevated temperatures; thermal stresses; alloys of low thermal expansion; Ti alloys and precipitation-hardening steels.

1569* The Aerodynamic Forces on an Aerofoil in Non-Uniform Unsteady Motion in a Closed Tunnel. S. Rosenblat. *Royal Society of London, Philosophical Transactions*, v. 250, ser. A, no. 977, Oct. 17, 1957, p. 247-278.

1570 On the Lifting Aerofoil in a Wind Tunnel With Porous Walls. L. C. Woods. *Royal Society, Proceedings*, v. 242, ser. A, Nov. 5, 1957, p. 341-354.

Calculations of wind-tunnel corrections to the lift and moment acting on an airfoil in subsonic two-dimensional flow.

1571* (Romanian.) Calculation of the Deflection of the Vane and the Induced Velocities of the Rotor of the Helicopter. **Calculul Deflectiunii vînei şi al vitezelor induse pe discul rotorului de elicopter.** N. N. Patraulea. *Studii şi Cercetări de Mecanică Aplicată*, v. 8, no. 1, Jan.-Mar. 1957, p. 13-22.

Calculation based on theory of the almost-rectilinear trail motions was applied to the rotor of the helicopter, considered as a permeable surface. Constant pressure variation and negligible tangential forces are assumed.

1572* (Polish.) Determination of Bending Moments of Helicopter Blades in Hovering. **Wyznaczanie momentów gnących łopaty śmigłowca w locie wiszacym.** Jerzy Lipka. *Technika Lotnicza*, v. 12, no. 5, Sept.-Oct 1957, p. 141-146.

Three methods were studied for calculating the amplitude of the bending movement of rotor blades and stresses in an arbitrary section of the blade.

1573 Effect of a Wing Leading-Edge Flap and Chord-Extension on the High Subsonic Control Characteristics of an Aileron Located at Two Spanwise Positions. Robert F. Thompson and Robert T. Taylor. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* L55B18a, May 1955, 59 p. (TL782 Un3rm Vis.)

1574 Investigation of the Effects of Model Scale and Stream Reynolds Number on the Aerodynamic Characteristics of Two Rectangular Wings at Supersonic Speeds in the Langley 9-Inch Supersonic Tunnel. Donald E. Coletti. *U. S. National Advisory Committee for Aeronautics Research Memorandum* L55D29, June 1955, 32 p. (TL782 Un3rm Vis.)

1575 Effects of Wing-Mounted Tank-Type Stores on the Low-Lift Buffeting and Drag of a Swept-Wing Airplane Configuration Between Mach Numbers of 0.8 and 1.3. Homer P. Mason. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* L55D27, Oct. 1955, 34 p. (TL782 Un3rm Vis.)

1576 A Theoretical Analysis of a Simple Aerodynamic Device to Improve the Longitudinal Damping of a Cruciform Missile Configuration at Supersonic Speeds. James E. Clements. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* L55H31, Oct. 1956, 36 p. (TL782 Un3rm Vis.)

Variations in the floating-control hinge-moment characteristics with Mach number and altitude are considered. A substantial increase in airframe damping was obtained through a proper choice of the hinge-moment coefficients and viscous damping rate.

1577 Transonic Wind-Tunnel Investigation of the Effects of Incidence and Body Indentation on the Wing Loads of a 45° Sweptback Wing-Body Combination. Robert J. Platt, Jr. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* L55H26, Jan. 1956, 24 p. (TL782 Un3rm Vis.)

1578 Preliminary Measurements of the Aerodynamic Yawing Derivatives of a Triangular, a Swept, and an Unswept Wing Performing Pure Yawing Oscillations, With a Description of the Instrumentation Employed. M. J. Queijo, Herman S. Fletcher, C. G. Marple, and F. M. Hughes. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* L55L14, Apr. 1956, 35 p. (TL782 Un3rm Vis.)

1579 Experimental Determination of the Effects of Frequency and Amplitude on the Lateral Stability Derivatives for a Delta, a Swept, and an Unswept Wing Oscillating in Yaw. Lewis R. Fisher. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* L56A19, Apr. 1956, 67 p. (TL782 Un3rm Vis.)

Three wing models were oscillated in yaw about their vertical axes to determine the effects of systematic variations of frequency and amplitude of oscillation on the in-phase and out-of-phase combination lateral stability derivatives resulting from this motion.

1580 Visualization of Rotor Tip Secondary Flows With Blade Tip Air Discharge and Suction in a Low-Speed Turbine. Milton G. Kofskey and Hubert W. Allen. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* E56E16, Aug. 28 p. (TL782 Un3rm Vis.)

Smoke was used to visualize the effects of turbine rotor blade tip air discharge and suction on the rotor tip secondary-flow patterns.

1581 A Study of the Motion and Aerodynamic Heating of Missiles Entering the Earth's Atmosphere at High Supersonic Speeds. H. Julian Allen and A. J. Eggers, Jr. *U. S. National Advisory Committe for Aeronautics, Technical Note* 4047, Oct. 1957, 61 p. (TL570 Un3t)

1582 Motion of a Ballistic Missile Angularly Misaligned With the Flight Path Entering the Atmosphere and Its Effect Upon Aerodynamic Heating, Aerodynamic Loads, and Miss Distance. H. Julian Allen. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4048, Oct. 1957, 66 p. (TL570 Un3t)

1583 Effects of Extreme Surface Cooling on Bundary-Layer Transition. John R. Jack, Richard J. Wisniewski, and N. S. Diaconis. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4094, Oct. 1957, 19 p. (TL570 Un3t)

Bundary-layer transition studies were made on various bodies of revolution at a Mach number of 3.12 and for Reynolds numbers per ft. as large as 15×10^6. Extreme surface cooling promotes early transition even with favorable pressure gradients and blunt leading edges. Effects of surface finish were small with moderate cooling, but quite large with extreme cooling.

1584 Study of Pressure Distributions on Simple Sharp-Nosed Models at Mach Numbers From 16 to 18 in Helium Flow. Wayne D. Erickson. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4113, Oct. 1957, 42 p. (TL570 Un3t)

1585 Fatigue Investigation of Full-Scale Transport-Airplane Wings. Variable-Amplitude Tests With a Gust-Load Spectrum. Richard E. Whaley. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4132, Nov. 1957, 43 p. (TL570 Un3t)

Crack-initiation areas, frequency of occurrence of cracks, crack propagation, liftetime to crack initiation, lifetime to final failure, and spread in lifetime are investigated and compared with results from constant-amplitude tests on similar wings.

1586* (Russian.) Certain Variational Problems in Connection With Satellite Launching. **Nekotorye variatsionnye zadachi, sviazannye s zapuskom iskusstvennogo sputnika zemli.** D. E. Okhotsimskii and T. M. Eneev. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 1a, Sept. 1957, p. 5-32.

Discusses the problem of launching a satellite and putting it into an orbit.

1587* (Russian.) Determination of the Life of the Artificial Satellite, and Study of Its Orbit Disturbance. **Opredelenie vremeni sushchestvovaniia iskusstvennogo sputnika zemli i issledovanie vekovykh vozmushchenii ego orbity.** D. E. Okhotsimskii, T. M. Eneev, and G. P. Taratynova. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 1a, Sept. 1957, p. 33-50.

Calculation of satellite life by the method of integral equation curves of first order in relation to one parameter.

1588* (Russian.) Traveling of the Artificial Satellite in the Earth's Non-Central Gravitational Field in the Presence of Atmospheric Resistance. **O dvizhenii iskusstvennogo sputnika v netsentral'nom pole tiagoteniia zemli pri nalichii soprotivleniia atmosfery.** G. P. Taratynova. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 1a, Sept. 1957, p. 51-58.

Calculation of satellite movement with a digital computer.

1589* (Russian.) The Effect of Geophysical Factors on Satellie Movement. **O vliianii geofizicheskikh faktorov na dvizhenie sputnika.** I. M. Iatsunskii. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 1a, Sept. 1957, p. 59-71.

Effect of factors such as non-sphericity of the earth, anomaly of gravity, and air resistance.

1590* (Russian.) Some Problems of Dynamics of Flight to the Moon. **O nekotorykh zadachakh dinamiki poleta k lune.** V. A. Egorov. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 1a, Sept. 1957, p. 73-117.

Data on work done in 1953-1955 concerning the following problems: shape and classification of trajectories; possible trajectories of moon circling with return to earth; possibilities of periodic circling of the moon and earth; the minimum initial speed needed to reach the moon; evaluation of the different trajectories.

1591* (English.) **The Forces on a Thin Airfoil in Slightly Parabolic Shear Flow.** E. E. Jones. *Zeitschrift für Agewandte Mathematik und Mechanik*, v. 37, nos. 9-10, Sept.-Oct. 1957, p. 362-370.

Aerodynamic characteristics of a thin cambered airfoil are determined when the airfoil is set at incidence in a shear flow of incompressible inviscid fluid.

See also: **2100** (data recording system); **2140** (high altitude carbon brush problems); **2141** (solar battery for Russian satellite); **2343** (Russian satellite studies); **2344** (Russian satellite studies); **2347** (Russian satellite studies); **2348** (Russian satellite studies); **2349** (Russian satellite studies); **2350** (Russian satellite studies); **2402** (recording accelerometer); **2880** (instrumentation of human endurance).

AGRICULTURE

1592* Plant Growth Inhibitions by Certain Imidazole Compounds and Their Preventions With Metal Ions. D. J. McCorquodale and R. E. Duncan. *American Journal of Botany*, v. 44, Oct. 1957, p. 715-722.

Imidazole, benzimidazole, and histamine, when present in the growth medium, induced remarkably similar growth inhibitions in the primary roots of *Vicia faba*. These effects were markedly influenced by the presence of metal ions, especially Ca, Mn, and Zn.

1593* Fungal Associations. I. Synergistic Relation Between *Rhizoctonia solani* Kühn and *Fusarium solani* Snyder and Hansen in Causing a Potato Tuber Rot. II. Cultural Studies on *Rhizoctonia solani* Kühn, *Fusarium solani* Snyder and Hansen, and Other Fungi, and Their Interactions. Hussein Elarosi. *Annals of Botany*, v. 21, new ser., Oct. 1957, p. 555-585 + 4 plates.

1594* The Function of Trace Metals in the Nitrogen Metabolism of Plants. D. J. D. Nicholas. *Annals of Botany*, v. 21, new ser., Oct. 1957, p. 587-598.

Trace metals are associated with flavoproteins, a number of which are key enzymes in the nitrogen metabolism of plants. Iron, Mo, V, and W may all be involved in the process of N_2 fixation in free living micro-organisms and in the root nodule bacteria.

1595* Experimental Control of Citrus Fruit Decay With 1-Piperidino-2-Phenyl-3-Butanone Hydrochloride. H. J. Florestano and M. E. Bahler. *Applied Microbiology*, v. 5, Sept. 1957, p. 303-305.

Definite experimental control of blue and green mold decay and stem-end rot of oranges was obtained following application of an alcoholic spray containing the fungicide in concentrations ranging from 0.5 to 5%.

1596 The Nature of the Association of *Europhium Trinaciforme* With Pole Blight Lesions. A. K. Parker. *Canadian Journal of Botany*, v. 35, Nov. 1957, p. 845-856 + 2 plates.

1597 Studies of Western Tree Rusts. III. *Milesia Laeviuscula*, a Needle Rust of Grand Fir. W. G. Ziller. *Canadian Journal of Botany*, v. 35, Nov. 1957, p. 885-894 + 2 plates.

Pycnial and aecial states of this rust are described.

1598 Incorporation of C^{14} or P^{32} Into the Phosphatides of Runner Bean Leaves. Frank M. Eberhardt and Morris Kates. *Canadian Journal of Botany*, v. 35, Nov. 1957, p. 907-921.

Phosphatide content of primary leaves increased linearly with time, between the 8th and 20th day of development.

1599* Some Morphological and Biochemical Characteristics of a Soil Bacterium Which Decomposes 2,4-Dichlorophenoxyacetic Acid. G. R. Bell. *Canadian Journal of Microbiology*, v. 3, Oct. 1957, p. 821-840 + 3 plates.

1600* The Inheritance of Rust Resistance. III. The Inheritance of Stem Rust Resistance in Nine Kenya Varieties of Common Wheat. D. R. Knott. *Canadian Journal of Plant Science*, v. 37, Oct. 1957, p. 366-384.

1601 Greenhouse Crop Response to Water-Insoluble Phosphates With Different Surface Areas. M. A. Norland, W. A. Jackson, and G. A. Wieczorek. *Journal of Agricultural and Food Chemistry*, v. 5, Nov. 1957, p. 848-851.

Chemical composition appears to be more critical than surface area.

1602 Chemical Structure and Activity of Pyrethrin and Allethrin Synergists for Control of the Housefly. Morton Beroza and W. F. Barthel. *Journal of Agricultural and Food Chemistry*, v. 5, Nov. 1957, p. 855-859.

The best unit of structure observed was the 3,4-methylenedioxyphenyl group. Compounds with alcohol, carboxylic acid, or acyclic hydrocarbon radicals as side chains did not exhibit appreciable synergism; whereas those with ether, ester, acetal sulfoxide, sulfone, or amide substituents were most productive of synergism.

1603* The Role of Boron in Plant Growth. I. The Effect on General Growth, Seed Production and Cytological Behaviour. W. J. Whittington. *Journal of Experimental Botany*, v. 8, Sept. 1957, p. 353-367.

Boron fertilizers are only beneficial where deficiency symptoms have been shown.

1604* Some Experiments to Investigate the Control of Apple Sawfly, *Hoplocampa Testudinea* (Klug), by Concentrate Sprays. G. H. L. Dicker and R. P. Tew. *Journal of Horticultural Science*, v. 32, Oct. 1957, p. 254-264.

Application of small volumes of concentrated dispersions of insecticides in strong lime-sulfur was effective.* The insecticides studied were nicotine and the three chlorinated hydrocarbons, γ-BHC, aldrin, and endrin.

1605 The Caking of Granular Fertilizers. An Investigation on a Laboratory Scale. A. L. Whynes and T. P. Dee. *Journal of the Science of Food and Agriculture*, v. 8, Oct. 1957, p. 577-591.

Apparatus and technique. Storage time, pressure, temperature, and moisture content are important variables.

1606* Factors Affecting the Ability of Plants to Absorb Phosphate From Soils. I. The Relationship Between Labile Phosphate and Absorption. R. Scott Russell, E. W. Russell, and P. G. Marais. *Journal of Soil Science*, v. 8, no. 2, Sept. 1957, p. 248-267.

1607* Induction of Bolting and Flowering in Hyoscyamus and Samolus by a Gibberellin-Like Material From a Seed Plant. Anton Lang, James A. Sandoval, and Ahmed Bedri. *National Academy of Sciences of the United States of America, Proceedings*, v. 43, Nov. 1957, p. 960-964.

Concludes that gibberellin-like materials participate in the processes of flower formation in plants and their control by low temperatures and photoperiods.

1608* Modification of Radiation-Induced Injury by Post-treatment With Oxygen. Richard S. Caldecott, Elizabeth Bindloss Johnson, D. T. North, and C. F. Konzak. *National Academy of Sciences of the United States of America, Proceedings*, v. 43, Nov. 1957, p. 975-983.

Studies on irradiated barley seeds indicate that seeds with the lowest water content at the time of irradiation evidenced a striking sensitivity to postirradiation hydration in the presence of oxygen.

1609* A Biochemical Study of the Resistance of Potato Tuber Tissue to Attack by Various Fungi. J. Kuć. *Phytopathology*, v. 47, Nov. 1957, p. 676-680.

1610* Comparison of Pruning (Topping, Suckering) Effects in Normal and Boron-Deficient Tobacco on Relative Growth and Alkaloid Content of Leaf, Stalk, and Root. Robert A. Steinberg and R. N. Jeffrey. *Plant and Soil*, v. 9, Sept. 1957, p. 64-74.

1611* Characterizing Root Activity of Alfalfa by Radioactive Tracer Techniques. R. C. Lipps, R. L. Fox, and F. E. Koehler. *Soil Science*, v. 84, Sept. 1957, p. 195-204.

Two methods were compared for estimating the activity of plant roots at various depths in the soil. Methods involved the use of P^{32} tagged fertilizer.

See also: **1730** (granulation of mixed fertilizers); **1732** (manufacture of fertilizer); **1919** (acaricidal and insecticidal properties of sulfones).

BIOCHEMISTRY AND BIOPHYSICS

1612 Electric Properties of Macromolecules. I. A Study of Electric Polarization in Polyelectrolyte Solutions by Means of Electric Birefringence. C. T. O'Konski and A. J. Haltner. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5634-5649.

A study of electric birefringence in dilute solutions of a homogeneous preparation of the rod-like tobacco mosaic virus. Variables included TMV and electrolyte concentrations *p*H, field strength and frequency of the polarizing field, and the behavior in various transient fields.

1613 The α-Chymotrypsin-Catalyzed Hydrolysis of a Series of Hydrazides. II. Evaluation of the Kinetic Constants for Aqueous Systems at 25° and at the Optimum *p*H for Each Specific Substrate. Ralph Lutwack, Howard F. Mower, and Carl Niemann. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5690-5693.

1614 Synthesis of a Biologically Active Octapeptide Similar to Natural Isoleucine Angiotonin Octapeptide. Hans Schwarz, F. Merlin Bumpus, and Irvin H. Page. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5697-5703.

1615 Deformation of Deoxyribonucleate. II. Precipitation of Heat-Deformed DNA With Millimolar Lead Ion. Vincent L. Stevens and Edward L. Duggan. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5703-5706.

Heat-deformed DNA may be separated from unheated DNA with lead ion.

1616 Synthetic Hypotensive Agents. VI. 3- and 4-(3'-Aminopropyl)-Piperidine Derivatives. Arthur P. Phillips. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5754-5756.

A series of 1-methyl-3(and 4)(3'-tertiaryaminopropyl-piperidines and their bis-quaternary ammonium salts were made for testing as potential hypotensive ganglionic blocking drugs.

1617 Theoretical Study of Nitrogen Heterocyclics. II. Molecular Diagrams and Carcinogenic Activities of Some Mono- and Dibenzocarbazoles. J. I. Fernández-Alonso, L. Carbonell Vila, and R. Domingo. *American Chemical Society, Journal*, v. 79, Nov. 20, 1957, p. 5839-5844.

1618* Collagen Reactivity With Metals. Rubin Borasky. *American Leather Chemists Association, Journal*, v. 52, Nov. 1957, p. 596-610.

Electronoscopic observations and shrinkage temperature data on collagen treated with metallic compounds which on dissociation yield metal or metal-containing ions which have properties governing their (metals) reactivity with collagen. Significance of results relative to deposition of metals in skeletal tissue and in explaining a mechanism of mineral tannage.

1619 The Tranquilizers. III. Ivan F. Bennett. *American Pharmaceutical Association, Journal (Practical Pharmacy Ed.)*, v. 18, Nov. 1957, p. 665-667.

Effects of meprobamate treatment.

1620 Steroidal Sapagenins. XLIII. Survey of Plants for Steroidal Sapogenins and Other Constituents. Monroe E. Wall, et al. *American Pharmaceutical Association, Journal, (Scientific Ed.)*, v. 46, Nov. 1957, p. 653-684.

Results of analysis of 1000 plant samples, largely from species of *Agave Dioscorea*, and *Yucca*.

1621* Quatrimycin: Preparation and Properties. Murray A. Kaplan, A. P. Granatek, and F. H. Buckwalter. *Antibiotics & Chemotherapy*, v. 7, Nov. 1957, p. 569-576.

Methods of preparation, a chromatographic method of detection and separation, and the physical, chemical, bacteriologic, and pharmacologic properties of quatrimycin, an epimer of tetracycline.

1622* Isolation and Properties of the Components of Staphylomycin. H. Vanderhaeghe, P. Van Dijck, G. Parmentier, and P. De Somer. *Antibiotics & Chemotherapy*, v. 7, Nov. 1957, p. 606-614.

1623* Factors Affecting the Initiation of Respiration of *Streptococcus lactis*. R. Spendlove, H. H. Weiser, and W. J. Harper. *Applied Microbiology*, v. 5, Sept. 1957, p. 281-285.

1624* Stimulation of Streptomycin Production by a Series of Synthetic Organic Compounds. J. H. Ferguson, H. T. Huang, and J. W. Davisson. *Applied Microbiology*, v. 5, Sept. 1957, p. 339-343.

Production of streptomycin in a near-synthetic medium is stimulated by the addition of a number of 5,5-dialkylbarbituric acids and related compounds. The maximum activity in the barbiturate series is shown to occur in 5,5-diethylbarbituric acid (barbital) and 5,5-ethyl*iso*propylbarbituric acid.

1625* The Influence of Manganese and Phosphate on Delayed Light Emission, Fluorescence, Photoreduction, and Photosynethesis in Algae. E. Kessler, W. Arthur, and J. E. Brugger. *Archives of Biochemistry and Biophysics*, v. 71, Oct. 1957, p. 326-335.

1626* The Effects of 6-Mercaptopurine on *Lactobacillus casei*. M. Earl Balis, et al. *Archives of Biochemistry and Biophysics*, v. 71, Oct. 1957, p. 358-366.

Effects of 6-mercaptopurine on the utilizations of exogenous adenine, guanine, hypoxanthine, 2,6-diaminopurine, and adenosine 3'phosphate and on their transformations to the adenine and guanine moieties of the nucleic acids.

1627* Application of Antigen-Antibody Reactions on Supporting Media to the Purification of Proteins. I. A Model System Using Bovine Serum Albumin and Bovine γ-Globulin. II. The Removal of a Subtilisin-Like Enzyme From Carboxypeptidase Preparations by Antisubtilisin on Cellulose. S. S. Stone and R. R. Williams. *Archives of Biochemistry and Biophysics*, v. 71, Oct. 1957, p. 377-392.

1628* The Inhibition of Serine Metabolism in *Leuconostoc mesenteroides* P-60. I. Microbiological Activity of D- and L-Penicillamine. H. Vasken Aposhian, Sheldon M. Wolff, and W. Gardner Rhea, Jr. *Archives of Biochemistry and Biophysics*, v. 71, Oct. 1957, p. 442-450.

1629* Acid Hydrolysis of Dibenzoyl-L-Lysine Anilide Without Racemization. Takashi Murachi. *Archives of Biochemistry and Biophysics*, v. 72, Nov. 1957, p. 49-53.

Incubation of α, ε-*N*, *N'*-dibenzoyl-L-lysine anilide in 5 *N* HCl- containing methyl Cellosolve at 25 C for seven days resulted in selective and nonracemizing clevage of the anilide linkage to produce dibenzoyl-L-lysine, from which optically pure L-lysine hydrochloride was obtained after hydrolysis with 6 *N* HCl.

1630* Lethal Effect of Visible Light on a Mutant Strain of Haploid Yeast. I. General Dependencies. II. Absorption and Action Spectra. M. M. Elkind and Harriet Sutton. *Archives of Biochemistry and Biophysics*, v. 72, Nov. 1957, p. 84-111.

1631* (English.) **Purification and Properties of Dialkylfluorophosphatase.** J. A. Cohen and M. G. P. J. Warringa. *Biochimica et Biophysica Acta*, v. 26, no. 1, Oct. 1957, p. 29-39.

Zone electrophoresis on starch columns was used to purify preparations of fluorophosphatase. Fractions were obtained which could activate the enzyme, although they lacked enzymatic activity themselves. This activation was quite marked in the presence of Mn^{++} ions, particularly with a DFP substrate. Mn^{++} ions activated the hydrolysis of DFP and tabun, but inhibited that of most other substrates. Inhibition of the enzyme by *p*-chloromercuribenzoic acid is reversible by use of cysteine. Intravenous injection of rats with DFPase offered some protection against subsequent lethal doses of DFP or sarin.

1632* Studies of Zone Electrophoresis in Vertical Columns. II. Zone Electrophoresis of Serum Proteins. Hans I. Gedin and Jerker Porath. *Biochimica et Biophysica Acta*, v. 26, no. 1, Oct. 1957, p. 159-169.

1633* Steroids and Related Products. X. 17α-Bromoprogesterone, a New Potent Gestogen. Ch. R. Engel and H. Jahnke. *Canadian Journal of Biochemistry and Physiology*, v. 35, Nov. 1957, p. 1047-1055.

Preparation from pregnenolone acetate.

1634 Photosynthesis and Metabolism of Marine Algae. I. Photosynthesis of Two Marine Flagellates Compared With Chlorella. R. G. S. Bidwell. *Canadian Journal of Botany*, v. 35, Nov. 1957, p. 945-950 + 1 plate.

1635* Effect of Antibiotics on Oxidation of Progesterone by Two Streptomycetes. D. Perlman, M. J. Weinstein, and G. E. Peterson. *Canadian Journal of Microbiology*, v. 3, Oct. 1957, p. 841-846.

Studies of the microbial conversion of progesterone to $\Delta^{1,4}$-androstadiene-3,17-dione by *Streptomyces lavendulae* and to 16α-hydroxyprogesterone by *Streptomyces* sp. ATCC 11,009 suggest that the enzymes formed in these two streptomycetes which carry out the transformation of progesterone are adaptive in origin.

1636* The Use of Beta-Propiolactone for the Preparation of Virus Vaccines. I. Selection of Reaction Conditions. II. Antigenicity. John R. Polley and Muriel M. Guerin. *Canadian Journal of Microbiology*, v. 3, Oct. 1957, p. 863-877.

1637* (German.) Chemistry and Biochemistry of "Cobalamine". **Zur Chemie und Biochemie der "Cobalamine". VII.** 2-Methylmercapto-Adenine-Cobalamine Analog, a New B_{12} Factor of Sapropel. **2-Methylmercapto-adenin-cobalamin-Analogon, ein neuer B_{12}-Faktor des Faulschlammes.** Wilhelm Friedrich and Konrad Bernhauer. *Chemische Berichte*, v. 90, no. 9, 1957, p. 1966-1973.

Study of crystallized B_{12} factor obtained from sapropel, which is known as a 2-methylmercapto-cobalamine analog.

1638* (German.) The Influence of Sulfur Dioxide on Diazo-Compounds. **Über die Einwirkung von Schwefeldioxyd auf Diazoverbindungen. I. Dodecahydro-Diethyl Stilbene. Dodekahydro-Diäthylstilben.** Gerhard Hesse and Ernst Reichold. **II.** Ethylene Sulfone. **Äthylensulfon.** Gerhard Hesse, Ernst Reichold, and Suresh Majmudar. *Chemische Berichte*, v. 90, no. 10, 1957, p. 2101-2113.

Core-hydrated 1,2-diethyl-stilbenes were synthetized to obtain, by means of substitution, androgenic compounds with pharmacologic properties.

1639* (Russian.) On the First Carbohydrates Formed in Photosynthesis. **K voprosu o pervykh uglevodakh, obrazuiushchikhsia v protsesse fotosinteza.** M. V. Turkina. *Doklady Akademii Nauk SSSR*, v. 115, no. 6, Aug. 21, 1957, p. 1142-1145 + 1 plate.

Tracing the formation of the first free (non-phosphorylated) carbohydrates in the photosynthesis process of plants with various types of carbohydrate exchange. The following plants were studied: sugar beet for sucrose, Jerusalem artichoke for insulin, tobacco for amylo-compounds, onion for mannose, and sedum for heptose.

1640 Studies on the Extraction of *Brucella* Antigens. I. The System of Extraction. John W. Foster. *Journal of Bacteriology*, v. 74, Oct. 1957, p. 514-524.

An adaptation of the multivariable system of plasma fractionation was applied to the selective extraction of biologically active material from bacterial cells. Close adjustment of pH and ionic strength was achieved by dialysis of *Brucella* cell suspensions against dilute buffers to which NaCl was added.

1641* Studies on the Biosynthesis of Bacterial and Viral Pyrimidines. III. Derivatives of Dihydrocytosine. Maurice Green and Seymour S. Cohen. **IV. Utilization of Pyrimidine Bases and Nucleosides by Bacterial Mutants.** Seymour S. Cohen, Janet Lichtenstein, Hazel D. Barner, and Maurice Green. **V. Hydrogenation of 5-Hydroxymethylpyrimidines.** Maurice Green, Hazel D. Barner, and Seymour S. Cohen. *Journal of Biological Chemistry*, v. 228, Oct. 1957, p. 601-631.

1642* The Purification and Properties of Microsomal Cytochrome Reductase. Philipp Strittmatter and Sidney F. Velick. *Journal of Biological Chemistry*, v. 228, Oct. 1957, p. 785-799.

Isolation as an essentially homogeneous flavo-protein from calf liver microsomes; molecular weight and physical properties; characterization of the coenzyme and other active groups; analysis for possible metal cofactors; general enzymatic properties of the reductase system.

1643* Amino Acid Composition of α-Chymotrysinogen, Including Estimation of Asparagine and Glutamine. Philip E. Wilcox, Elaine Cohen, and Wen Tan. *Journal of Biological Chemistry*, v. 228, Oct. 1957, p. 999-1019.

1644* The Action of Air Ions on Bacteria. I. Protective and Lethal Effects on Suspensions of Staphylococci in Droplets. A. P. Krueger, R. F. Smith, and Ing Gan Go. *Journal of General Physiology*, v. 41, Nov. 1957, p. 359-381.

In smog-contaminated atmospheres moderate concentrations of positive and negative air ions exerted a protective effect by delaying the drop in pH customarily observed and by diminishing the rate of evaporation. In clear air higher concentrations of positive and negative air ions accelerated the rate of death, apparently by direct action on the cells and by increasing the rate of evaporation.

1645* Effect of Preradiation Immunization on Resistance to Aerosol-Induced Infection in X-Irradiated Mice. Eugene H. Perkins and Stanley Marcus. *Journal of Immunology*, v. 79, Aug. 1957, p. 136-141.

Immunization with *Klebsiella pneumoniae prior* to X-irradiation increased the resistance of mice to challenge with an aerosol of the living organisms. A large total irradiation dose, given in increments, is far less detrimental to the host defenses than the same dose acutely administered.

1646 Studies of Imidazoles. VII. Substituted 1-Phenethylimidazoles and Related Compounds. W. N. Cannon, C. E. Powell, and R. G. Jones. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1323-1326.

Data on a series of 1-aralkylimidazoles, 2-mercaptoimidazoles, and 2-substituted mercaptomidazoles and their pharmacological activities.

1647 Snythetic Antiviral Agents. I. 4-Arylmethyl-4-Aryl-5-Oxohexanoic Acids and Certain of Their Derivatives. Edward J. Cragoe, Jr. and A. M. Pietruszkiewicz. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1338-1345.

Many of the compounds described have antiviral activity against certain influenza viruses.

1648 Further Studies With the Bacitracin Polypeptides. Lyman C. Craig and William Konigsberg. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1345-1353.

Fractionation of bacitracin by countercurrent distribution was reinvestigated from the standpoint of obtaining a product with the highest antibiotic activity. Data on amino acid analyses, ultimate analyses, determination of the amino groups capable of reacting with the Sanger reagent, and antibiotic activity is reported.

1649 Structures Related to Morphine. VIII. Further Syntheses in the Banzomorphan Series. Everette L. May and Edward M. Fry. **IX. Extension of the Grewe Morphinan Synthesis in the Benzomorphan Series and Pharmacology of Some Benzomorphans.** Nathan B. Eddy, James G. Murphy, and Everette L. May. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1366-1372.

1650 Antiparasitic Agents. I. Some New 2,4-Diaminopyrimidines. E. F. Rogers, W. J. Leanza, and L. H. Sarett. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1492-1494.

Six new substituted 2,4-diaminopyrimidines were prepared for chemotherapeutic evaluation. Three showed activity vs. *S. pyogenes;* one enhances sulfanilamide action vs. *Eimeria spp.*

1651* Influence of Post-Irradiation Administration of Methionine on the Excretion of Urea, Uric Acid & Creatinine. M. K. Nerurkar, A. J. Baxi, and M. B. Sahasrabudhe. *Journal of Scientific & Industrial Research*, v. 16, sec. C, Sept. 1957, p. 175-178.

1652* Influence of Total Body X-Irradiation on the Levels of (i) Creatine Phosphate, Inorganic Phosphorus & ATP in Muscle & (ii) Creatine, Creatinine, N'Methylnicotinamide & Nitrogen in Urine. U. S. Kumta, S. U. Gurnani, and M. B. Sahasrabudhe. *Journal of Scientific & Industrial Research*, v. 16, sec. C, Sept. 1957, p. 179-181.

1653* Antibiotic X 340. I. Isolation, Antibacterial Action, Chemical Data & Its Partial Constitution. V. C. Vora, K. Shete, and M. M. Dhar. *Journal of Scientific & Industrial Research*, v. 16, sec. C, Sept. 1957, p. 182-185.

An antibiotic active against a large variety of microorganisms was isolated from an unidentified *Streptomyces* species. On the basis of chemical data, a partial structure is suggested.

1654 Methods of Biochemical Analysis. David Glick, editor. v. V. 502 p. 1957. Interscience Publishers, New York. (QP519 M56 Vis.)

Assay methods for cholinesterases; biological standards in biochemical analysis; α-keto acid determinations; microdetermination of Co in biological materials; activation analysis and its application in biochemistry; contamination in trace element analysis and its control; chemical determination of estrogens in human urine; infra-red analysis of vitamins, hormones, and coenzymes.

1655 Methods in Enzymology. Sidney P. Colowick and Nathan O. Kaplan, editors. v. IV. 979 p. 1957. Academic Press, New York. (QP601 C71m)

Techniques for characterization of proteins, metabolic studies, and isotope studies.

1656* (English.) Combined Phase and Fluorescence Microscopy. George R. Price and LeRoy Christenson. *Mikroskopie*, v. 12, nos. 5-6, 1957, p. 147-151 + 1 plate.

Ultra-violet or violet light (from a Hg arc) for fluorescence excitation and red or green light (from a tungsten filament lamp) for phase contrast illumination are combined by a beam splitter, so that fluorescent elements in a tissue section can be observed against a phase background that shows the general cell and tissue structure.

1657* Genetic Interaction Among Streptomycetes: Heterokaryosis and Synkaryosis. Donald H. Braendle and Waclaw Szybalski. *National Academy of Sciences of the United States of America, Proceedings*, v. 43, Nov. 1957, p. 947-955.

Heterokaryosis in streptomycetes denotes a co-operative venture in which genetically unlike nuclei perpetuate within a common cytoplasm as the result of hyphal anastomosis.

1658 National Cancer Institute Commemorative Symposium. v. 19. No. 2. 349 p. 1957. U. S. Department of Health, Education, and Welfare, Bethesda, Md. (RC261 Un3.2t)

Provisions of the National Cancer Institute Act; directors and staff of the institute. History and research activities. The chemotherapy program.

1659 New Unguent Bases and Lotions. Formulae and Uses. Isaac Kenneth Hoffman. 152 p. 1957. Chemical Publishing Co., New York. (RS201.03 H67n)

1660* Radiation Sensitivity of Enzymes in Wet and in Dry Yeast Cells. Franklin Hutchinson, Angela Preston, and Beatrice Vogel. *Radiation Research*, v. 7, Nov. 1957, p. 465-472.

Sensitivity to ionizing radiation was determined for coenzyme A and the enzymes invertase and alcohol dehydrogenase (ADH) in wet and dry yeast cells. The sensitivity wet vs. dry was about 2 to 1 for invertase, 20 to 1 for ADH, and 100 to 1 for coenzyme A.

1661* The Experimental Effect of X-Radiation and Cortisone on Serum Proteins. Alvar A. Werder, Creighton A. Hardin, and Perry Morgan. *Radiation Research*, v. 7, Nov. 1957, p. 500-507.

Mice were injected with 4 mg. of cortisone or given total body irradiation of 300 r. Irradiation produced an initial increase in erythrocyte and leukocyte counts, had little effect on granulocytes. Normal levels returned after one month. A marked drop in lymphoid elements reached a maximum at 24 hrs; lymph nodes appeared normal after one week. Bone marrow smears showed a depression in erythropoiesis, with recovery after two to four weeks. Cortisone had little effect on erythrocytes but rapidly lowered the leukocyte count. Normal levels were observed after 96 hrs. Lymphocytes were similarly affected, while the granulocytes, after a slight initial depression, showed a marked increase at 96 hrs., returning to normal after one month. Cortisone and irradiation produced little or no effect on serum albumin and α- and β-globulin, but depressed γ-globulin levels in over half the cases.

1662* The Sensitivity of Microorganisms to Irradiation Under Controlled Gas Conditions. P. Howard-Flanders and Tikvah Alper. *Radiation Research*, v. 7, Nov. 1957, p. 518-540.

Variation in radiosensitivity with O concentration was examined for three strains of bacteria and for a haploid yeast.

1663 The Structure of Vitamin B_{12}. I. An Outline of the Crystallographic Investigation of Vitamin B_{12}. Dorothy Crowfoot Hodgkin, et al. *Royal Society, Proceedings*, v. 243, ser. A, Oct. 29, 1957, p. 228-263.

X-ray analysis of four different crystal structures: air-dried and wet vitamin B_{12}, the selenocyanate derivative of B_{12}, and a hexacarboxylic acid prepared by degradation of the vitamin.

1664* (French.) Ammonium Molybdate and Serous Proteins-Molybdate d'ammonium et protéines sériques. Jean Marquevielle, Raymond Jensen, James Jolin, and Francis Tayeau. *Société Chimique de France, Bulletin*, 1957, no. 10, Oct., p. 1137-1141.

Effect of $(NH_4)_2\ MoO_4$ on different serum proteins. Formation of an electrovalent complex between molybdate and proteins. Effects of pH, protein concentration, and temperature.

1665* Preparation of Coated Radioautographs by Dipping Sections in Fluid Emulsion. B. Messier and C. P. Leblond. *Society for Experimental Biology and Medicine, Proceedings*, v. 96, Oct. 1957, p. 7-10.

A simplified coating method is described in which the radioactive slides are dipped in melted photographic emulsion. After exposure, the developed emulsion is protected with a coat of vinylite and mounted under coverslip.

1666* Actions of Chlorpromazine and of Reserpine on Spinal Reflex Activity in the Cat. William A. Krivoy. *Society for Experimental Biology and Medicine, Proceedings*, v. 96, Oct. 1957, p. 18-20.

Chlorpromazine and reserpine inhibit spinal reflex activity. The inhibition affects predominantly monosynaptic reflex pathways when submaximal stimuli and minimal doses are used. These effects do not result from circulatory changes, unless these be local alterations in the circulation within the spinal cord.

1667* Some Physical and Chemical Properties of Antibody Against Complement. W. S. Jeter and Albert P. McKee. *Society for Experimental Biology and Medicine, Proceedings,* v. 96, Oct. 1957, p. 118-121.

Studies on quantitative antibody protein, antibody expressed as carbon-14, Tiselius electrophoretic analyses, and fractionation of anticomplement-containing sera.

1668* Studies on Propagation of the Col SK Group of Viruses in Various Tissue Culture Media. Claus W. Jungeblut and Helen Kodza. *Society for Experimental Biology and Medicine, Proceedings,* v. 96, Oct. 1957, p. 133-139.

1669* Inhibition of Antibacterial Activity of Cycloserine by Alpha-Alanine. Amedeo Bondi, Joan Kornblum, and Christine Forte. *Society for Experimental Biology and Medicine, Proceedings,* v. 96, Oct. 1957, p. 270-272.

Alpha-alanine inhibits antibacterial activity of cycloserine on staphylococci, but not on other organisms studied. The inhibition appears to be of a competitive nature.

1670* (Russian.) Intensity of Glycine and Acetate Carbon Incorporation in the Glycogen and Protein of Rat Tissue Under the Effect of Ionizing Radiation. **Intensivnost' vkliucheniia ugleroda glitsina i atsetata v glikogen i belki tkanei krys pri vozdeistvii ioniziruiushchei radiatsii.** S. F. Epshtein. *Ukrainskii Biokhimicheskii Zhurnal,* v. 29, no. 3, 1957, p. 303-313.

1671* (Russian.) Changes in the Molecular Weight and Catalytic Activity of Certain Proteins Under the Effect of Ultra-Violet Radiation. **Izmeneniia molekuliarnogo vesa i kataliticheskoi aktivnosti nekotorykh belkov pod vliianiem ultrafioletovogo obliucheniia.** M. A. Kolomiichenko. *Ukrainskii Biokhimicheskii Zhurnal,* v. 29, no. 3, 1957, p. 361-370.

1672* (Russian.) Synthesis of Estrogen-Active Substances. **Sintez estrogennoaktivnykh veshchestv. II.** Symmetrical 1,3-Dialkyl Derivatives of 1,2,3-Tri-(*n*-Oxyphenyl)-Propane. **Simmetrichnye 1,3-dialkilproizvodnye 1,2,3-tri-(*n*-oksifenil)-propana.** G. I. Kiprianov and L. M. Kutsenko. *Ukrainskii Khimicheskii Zhurnal,* v. 23, no. 5, 1957, p. 655-658.

1673 The Transport of Bivalent Cations Into the Yeast Cell in Relation to Potassium and Phosphate Uptake. Aser Rothstein. *University of Rochester, Atomic Energy Project (U. S. Atomic Energy Commission),* UR-502, Aug. 1957, 21 p. (UF767 Un3.1ru Contin.)

1674* (Russian.) The Use of Bacterial Ferments for Regeneration of the Triacetate Film. **Primenenie bakterial'nykh fermentov dlia regeneratsii triatsetatnoi plenki.** I. D. Kasatkina. *Vestnik Akademii Nauk SSSR,* v. 27, no. 9, Sept. 1957, p. 77-78.

Preparation of bacterial ferment of *Bacillus mesentericus*: its use for removing gelatin from triacetate films.

1675* The Purification and Chromatography of Bacteriophages on Anion-Exchange Cellulose. E. H. Creaser and A. Taussig. *Virology,* v. 4, Oct. 1957, p. 200-208.

Method for the purification of the bacteriophages Tl, T2r, and T2r$^+$ from lysates of *Escherichia coli* using the cellulose anion-exchange adsorbent ECTEOLA. The chromatography of live bacteriophage, virus nucleic acid, and virus protein upon ECTEOLA columns.

1676* A Kinetic Study of Local Lesion Growth on *Nicotiana glutinosa* Resulting From Tobacco Mosaic Virus Infection. Irving Rappaport and Sam G. Wildman. *Virology,* v. 4, Oct. 1957, p. 265-274.

1677* Cultivation of Rabbit Myxoma and Fibroma Viruses in Tissues of Nonsusceptible Hosts. Donna M. Chaproniere and C. H. Andrews. *Virology,* v. 4, Oct. 1957, p. 351-365.

These viruses, which are naturally very host-specific, proved to be much less so in tissue culture. Myxoma virus multiplies *in vitro* in various tissues of squirrel, guinea pig, rat, hamster, and man, and produces cytopathic effects in some of these. Fibroma virus also multiplies in cultures of guinea pig, rat, and human tissues.

1678 The Visual Pigments. H. J. A. Dartnall. 216 p. 1957. John Wiley & Sons, New York. (QP479 D25v)

Pigments in the eye, their photoproducts, and methods of studying them. Physical chemistry and structure of visual purple. Isomerism and the visual pigments. Homogeneity of pigment solutions.

See also: **1746** (determination of "Tral"); **2000** (photoelectric properties of chlorophyll); **2191** (heart monitor for surgery); **2294** (preservation of beef with chlorotetracycline); **2831** (neutron generator for biological research).

CERAMICS AND CONCRETE

1679 New Testing Equipment for Quality Control. D. J. Weintritt and A. C. Perricone. *American Ceramic Society Bulletin,* v. 36, Nov. 1957, p. 401-405.

Design features of a rotational viscometer, low pressure filter press, and filtrate analysis units.

1680 The Solar Furnace in Ceramic Research. Pol Duwez. *American Ceramic Society Bulletin,* v. 36, Nov. 1957, p. 410-411.

Description and performance of several solar furnace installations.

1681 Ceramic Crucible for Melting Titanium. Berthold C. Weber, William M. Thompson, Hans O. Bielstein, and Murray A. Schwartz. *American Ceramic Society, Journal,* v. 40, Nov. 1957, p. 363-373.

Titanium can be melted, with no significant increase in hardness, in crucibles of an oxygen-deficient zirconia material modified in a novel way to make it thermally stable and inert to molten Ti. Limitations regarding overheating and soaking must be taken into account.

1682 Phase Equilibria in the System $BaTiO_3$-$SrTiO_3$. J. A. Basmajian and R. C. DeVries. *American Ceramic Society, Journal,* v. 40, Nov. 1957, p. 373-376.

System is characterized by a complete series of solid solutions with a minimum at 2.5 mole % $SrTiO_3$ and 1585 C. The hexagonal $BaTiO_3$ phase is suppressed to a region extending no farther than 0.5% $SrTiO_3$ at 1600 C. No immiscibility gap was found.

1683 Plastic Deformation of Ceramic-Oxide Single Crystals. II. J. B. Wachtman, Jr. and L. H. Maxwell. *American Ceramic Society, Journal,* v. 40, Nov. 1957, p. 377-385.

Sapphire single crystals were studied.

1684 Measuring the Rate of Hardening of Concrete by Bond Pullout Pins. T. M. Kelly and D. E. Bryant. *American Society for Testing Materials, Preprint No.* 76, 1957, 12 p. (TA401 Am35p Vis.)

Stainless steel pins were embedded vertically in a concrete specimen immediately after the concrete was mixed. Individual pins were subsequently pulled out at increasing time intervals and the load at bond failure measured in each case.

1685 Wear Tests on Concrete Using the German Standard Method of Test and Machine. James L. Sawyer. *American Society for Testing Materials, Preprint No.* 78, 1957, 11 p. (TA401 Am35p Vis.)

The Ebener testing machine duplicates a practical wear condition by rolling steel balls under pressure over the concrete surface. This results in the surface being subjected to abrasion caused mainly by rolling and sliding friction accompanied by some pounding or beating force.

1686 Measuring Shrinkage of Concrete Block. E. L. Saxer and H. T. Toennies. *American Society for Testing Materials, Preprint No.* 80, 1957, 18 p. (TA401 Am35p Vis.)

Comparisons of three different methods.

1687 Fallacies in the Current Per Cent of Total Absorption Method for Determining and Limiting the Moisture Content of Concrete Block. Carl A. Menzel. *American Society for Testing Materials, Preprint No.* 81, 1957, 15 p. (TA401 Am35p Vis.)

Recommends use of the Relative Humidity Method which provides a reliable indication in about 20 to 60 min. of the state of dryness and potentiality for drying shrinkage of concrete block in subsequent exposure to atmospheric conditions.

1688* (German.) The Liquid Phase in Fire Clays. **Die Schmelzphase in Schamottesteinen. II.** Effect of Iron(III)-Oxide and Alkali on the Formation of Mullite and Glass in Fire Bricks. **Der Einfluss von Eisen(III)-oxyd und Alkalien auf die Mullit- und Glasbildung in gebranntem Ton.** Arun Kumar Bose, Hermann Müller-Hesse, and Hans-Ernst Schwiete. *Archiv für das Eisenhüttenwesen*, v. 28, Oct. 1957, p. 667-670.

Investigations on the formation of mullite, cristobalite, and liquid phase in mixtures of clay and Fe_2O_3, clay and orthoclase, as well as clay, Fe_2O_3, and orthoclase at 1050, 1150, 1250, 1350, 1450, and 1550 C.

1689 Manufacture of the ThO_2-UO_2 Ceramic Fuel Pellets for Borax-IV. J. H. Handwerk, C. L. Hoenig, and R. C. Lied. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5678, Aug. 1957, 28 p. (UF767 Un3.1an Contin.)

1690 Effect of Constitution of Graphites on Their Stability Under Low-Temperature Irradiation. Luther D. Loch, Alfred E. Austin, Ralph J. Harrison, and Winston H. Duckworth. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-1042(Del.), Sept. 1955, 73 p. (UF767 U3b Contin.)

Research on the relationships between graphite constitution and irradiation stability resulted in the development of graphite types with greatly improved dimensional stability under cold test-hole irradiation. Experimental graphites made from sugars, phenolic resins, coal-tar pitches, and petroleum asphalts were irradiated for 500 to 2800 MD/CT.

1691 (German.) The Study of Fine-Grain Ceramic Materials, and Their Importance in Technology. **Über die Untersuchung feinkörniger keramischer Rohstoffe und ihre technologische Bedeutung.** O. E. Radczewski. *Berichte der Deutschen Keramischen Gesellschaft*, v. 34, no. 9, Sept. 1957, p. 297-302.

Thermogravimetric analysis and the "Enslin test" as methods for measuring plasticity and drying and burning processes.

1692 (German.) Changes Within the Pore Structure of Fireproof Products Caused by the Diffusion of Flux-Bearing Melts. **Die Veränderungen im Porenaufbau feuerfester Erzeugnisse durch die Wanderung der flussmittelhaltigen Schmelzen.** K. Konopicky. *Berichte der Deutschen Keramischen Gesellschaft*, v. 34, no. 9, Sept. 1957, p. 302-307.

Changes in chemical composition of silica bricks from an open-hearth furnace. Analysis of changes in pore structure accompanying these changes. Investigation of a fire clay after a year's use.

1693* (Russian.) The Influence of Zirconium and Titanium on Some Properties of Silicate Glasses. **Vliianie tsirkoniia i titana na nekotorye svoistva silikatnykh stekol.** M. A. Bezborodov and I. S. Kachan. *Doklady Akademii Nauk SSSR*, v. 115, no. 6, Aug. 21, 1957, p. 1148-1151.

Effect of glass composition on water-, soda-, and acid-resistance, and light refraction, thermal expansion, and softening temperature properties.

1694 The Systems CaF_2-LiF and CaF_2-LiF-MgF_2. W. E. Roake. *Electrochemical Society, Journal*, v. 104, Nov. 1957, p. 661-662.

Temperature-composition relationships were measured in the areas of liquidus temperatures below 1000 C.

1695* (Russian.) Heat Resisting Concrete Lining Instead of Chamotte Bricks. **Zamena obmurovki iz shamotnogo kirpicha zharoupornym betonom.** L. I. Oirekh. *Elektricheskie Stantsii*, v. 28, no. 10, Oct. 1957, p. 76-77.

Characteristics of heat-resisting concrete linings for high-power boiler furnaces.

1696 Modern Concepts of Fracture and Flow. I. Equilibria in Particulate Bodies. Eugene F. Poncelet. *Glass Industry*, v. 38, Oct. 1957, p. 551-558.

Fracture and flow are rate processes, requiring a new concept of stress to be applied to particulate bodies. The equilibria existing in a particulate body subjected to arbitrary stresses are established. The solutions are plotted in graph form, permitting numerical determination of these equilibria.

1697 Bottoms for Basic Open Hearth Furnaces. Stephen Wortman. *Iron and Steel Engineer*, v. 34, Nov. 1957, p. 127-133.

Review of developments in refractories, design, and construction.

1698* (Russian.) Studies of Aluminous Region of Ternary Aluminosiliceous Systems. **Izuchenie glinozemistoi oblasti troinykh aliumosilikatnykh sistem. II.** BeO-Al_2O_3-SiO_2 System. **Sistema BeO-Al_2O_3-SiO_2.** F. Ia. Galakhov. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1957, no. 9, Sept., p. 1032-1036 + 1 plate.

Preparation of the compound $3\ BeO \cdot Al_2O_3$.

1699* (English.) **Magnetic Properties of the $FeTiO_3$-Fe_2O_3 Solid Solution Series.** Yoshikazu Ishikawa and Syun-iti Akimoto. *Physical Society of Japan, Journal*, v. 12, no. 10, Oct. 1957, p. 1083-1098.

1700* (Spanish.) Zirconium Based Electrotechnical Porcelain With High Mechanical Resistance. **Porcelana electrotécnica de elevada resistencia mecánica a base de circón.** L. Ferrer Olmos. *Revista de Ciencia Aplicada*, v. 11, no. 57, July-Aug. 1957, p. 301-305.

Preparation and firing at 1350 C of insulating porcelains of 34 different compositions for high voltage use. The samples without Mg, but with a high Zr percentage offered excellent mechanical and thermal properties.

1701* (French.) The Silicates. **Les silicates.** Robert De Reytere. *Revue Universelle des Mines*, v. 13, ser. 9, no. 10, Oct. 1957, p. 599-609.

Properties of the raw materials used in making refractory bricks. Transformations due to the effect of heat on siliceous, aluminous and clayey minerals and reactions during the firing process. Manufacturing processes; uses and properties of silica and alumina bricks.

1702* (French.) The Refractory Brick and Its Chemical, Physical, and Mechanical Properties. **La brique réfractaire et ses caractéristiques chimiques, physiques et mécaniques.** H. Detaille. *Revue Universelle des Mines*, v. 13, ser. 9, no. 10, Oct. 1957, p. 637-650.

Study of the liquid phase during firing of silica-alumina bricks, and of the vitreous phase during the cooling process. Modern theories concerning the vitreous phase; physical and mechanical properties of refractories.

1703* (Russian.) Electric Conductivity of Oxides and Their Wetting by Liquid Metals. **O elektroprovodnosti okislov i ikh smachivaemosti zhidkimi metallami.** V. N. Eremenko and Iu. V. Naidich. *Ukrainskii Khimicheskii Zhurnal*, v. 23, no. 5, 1957, p. 573-578.

Relationship between electric conductivity and wettability. Experimental study of the systems (Mg,Ni) O-Sn, (Mg,Ni) O-Ag, (Mg,Ni)O-Cu, and $(Al,Cr)_2O_3$-Fe.

1704 Experimental Investigation of Cermet Turbine Blades in an Axial-Flow Turbojet Engine. William C. Morgan and George C. Deutsch. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4030, Oct. 1957, 20 p. (TL570 Un3t)

Chipping in the tip region was a common characteristic in blade failures. Analysis indicates two probable causes of failure, impact and fatigue. Elimination of excessive C in the combustion chambers and avoiding conditions of extreme vibration chambers and avoiding conditions of extreme vibration made an improvement in test blade life.

1705* (French.) Heat Emissivity of Some Refractories. **Propriétes émissives de quelques matériaux réfractaies.** Jean Segall. *Verres et Réfractaires*, v. 11, no. 4, July-Aug. 1957, p. 203-217.

Measurements of heat radiation between 300 and 1500 C by spectral transmissivity determinations in the I-R between 1 and 8μ. Alumina, magnezia, and other commercial refractories were studied.

1706* (French.) The Uses of Silicones in the Glass-Making Industry. **Les emplois des silicones dans l'industrie du verre.**

Antoine Richard. *Verres et Réfractaires*, v. 11, no. 4, July-Aug. 1957, p. 218-222.

Special properties of silicones owing to the Si-O and Si-C bonds. Applications include lubrication of molds and protection of glass fibers and fabrics.

1707 Sub-Liquidus Equilibria for the Ternary System SrO-Al_2O_3-SiO_2. Paul S. Dear. *Virginia Polytechnic Institute, Bulletin, Engineering Experiment Station Series No.* 121, v. 50, Sept. 1957, 12 p. (TN21 V81b Vis.)

In addition to the three oxide end-members, the system contains three binary Sr silicate compounds, four binary Sr aluminate compounds, one binary alumino-silicate compound, and three ternary Sr alumino-silicate compounds.

1708 Résumé of Uranium Oxide Data. IX. J. Belle and L. J. Jones. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-TM-44, Mar. 1957, 111 p. (UF767 Un3.1wa Contin.)

1709* (Russian.) The Structure and Elastic Properties of Silicate Glass. **Stroenie i elasticheskie svoistva silikatnykh stekol.** G. M. Bartenev. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 9, Sept. 1957, p. 1917-1925.

Review of various hypotheses of glass structure.

1710* (Russian.) The Reaction of Glass With Aggressive Media. **O vzaimodeistvii stekla s agressivnymi sredami.** A. F. Zak. *Zhurnal Prikladnoi Khimii*, v. 30, no. 9, Sept. 1957, p. 1292-1298.

Chemical stability of glass fibers subjected to water, acid, and alkali actions.

See also: **1832** (preparation of Mg aluminate and Mg ferrite); **2065** (metallizing of technical ceramics); **2146** (properties of ferrites); **2148** (testing ceramic capacitors); **2424** (cement mill lubrication); **2435** (impulse testing of concrete beams); **2486** (UO_2 fuel elements); **2633** (wetting of solids by liquid metals); **2780** (vacuum sintering); **2912** (effect of pressure on barium titanate crystals); **2999** (glass fabric for plastic laminates).

CHEMICAL ENGINEERING

1711 Ion Exchange as a Unit Operation. Frank X. McGarvey. *Chemical Engineering*, v. 64, Dec. 1957, p. 255-260.

Background data on how to evaluate ion exchange. Application in water conditioning, sugar processing, uranium recovery, pharmaceuticals and organics, and recovery of waste metals.

1712 Determine Heat of Vaporization. Wallace R. Gambill. *Chemical Engineering*, v. 64, Dec. 1957, p. 261-266.

Numerous methods are outlined.

1713 Liquid-Liquid Flow in Packed Towers. Max Leva and C. Y. Wen. *Chemical Engineering*, v. 64, Dec. 1957, p. 267-271.

Correlations of flow data that pertain to liquid-liquid contacting in gravity-operated packed towers. Packing behavior when preferential wetting by either phase occurs.

1714 Heat Transfer in Thin-Film Centrifugal Processing Units. Arne R. Gudheim and James Donovan. *Chemical Engineering Progress*, v. 53, Oct. 1957, p. 476-481.

Details of a new processing device embodying rotating blades within a cylinder or truncated cone.

1715 A New Plastic Packing for Cooling Towers. A. L. Fuller, A. L. Kohl, and E. Butcher. *Chemical Engineering Progress*, v. 53, Oct. 1957, p. 501-505.

Advantages are high mass-transfer coefficient, low pressure-drop characteristics, and relatively inert chemical structure.

1716* Cathodic Protection for the Chemical Industry. C. L. Wilson. *Chemical & Process Engineering*, v. 38, Oct. 1957, p. 394-395.

Design of systems for the cathodic protection of various types of plant and equipment.

1717* Chinese Advances in the Synthesis of Liquid Fuels. Chang Ta-Yu, Leo Nan-Tsuen, and Chang Chun-Hao. *Chemical & Process Engineering*, v. 38, Oct. 1957, p. 403-407.

Pilot plant data on synthesis of liquid fuels from CO and H via a fluidized process, using a nitrided fused-iron catalyst, indicate that good operability can be realized at a fair selectivity level. Further work to improve selectivity of the catalyst is in progress. The surface complex of silica and Co is closely related to quality of the catalyst.

1718* A Graphical Method for the Calculation of Simultaneous Heat and Mass Transfer. G. H. P. Bras. *Chemical & Process Engineering*, v. 38, Nov. 1957, p. 427 + 3 pages.

Method can be used for the design of tublar cooler condensers and direct gas-liquid contact equipment such as water heaters, gas saturators, gas coolers, and driers.

1719* (German.) Laboratories for Radio-Isotopes. **Laboratorien für Radioisotope.** Ulrich O. Schanze. *Chemie-Ingenieur-Technik*, v. 29, no. 10, Oct. 1957, p. 645-651.

Isotope laboratories particularly suitable for chemical and similar purposes are described.

1720 Cosmetics Science and Technology. Edward Sagarin, editor. 1433 p. 1957. Interscience Publishers, New York. (TP 983 Sa18c)

A collection of up-to-date scientific information on all phases of cosmetic formulation and manufacture. Includes physiological and legal considerations.

1721* (German.) The Shell Oil-Gasification Process, and Its Application in Industry. **Der Shell Ölvergasungsprozess und seine Anwendung in der Industrie.** Max Gattiker. *Erdöl und Kohle*, v. 10, no. 9, Sept. 1957, p. 581-584.

Water gas from petroleum as raw material for industry. Hydration desulfurization of oil fractions.

1722 Preparation and Use of Snake-Cage Polyelectrolytes. Melvin J. Hatch, John A. Dillon, and Hugh B. Smith. *Industrial and Engineering Chemistry*, v. 49, Nov. 1957, p. 1812-1819.

Ion retardation is a new unit operation employing modified ion exchange resins (snake-cage polyelectrolytes) to remove dissolved salts from aqueous solutions of nonelectrolytes, and to separate metal ions or anions.

1723 Separation of Miscible Liquids by Polymeric Absorbents. J. C. H. Hwa, E. F. Meitzner, and C. H. McBurney. *Industrial and Engineering Chemistry*, v. 49, Nov. 1957, p. 1828-1834.

Solvents are selectively absorbed from solvent mixtures by a novel separation procedure using polymeric materials of limited swellability.

1724 Mixing of High Viscosity Newtonian and Non-Newtonian Fluids. R. E. Lee, C. R. Finch, and J. D. Wooledge. *Industrial and Engineering Chemistry*, v. 49, Nov. 1957, p. 1849-1854.

Data for design of chemical equipment.

1725 Continuous Process for Preparing Dialkyl Phosphites. Charles H. Campbell, David H. Chadwick, and Samuel Kaufman. *Industrial and Engineering Chemistry*, v. 49, Nov. 1957, p. 1871-1874.

Proposed process is continuous, requires no solvent, minimizes or eliminates the cooling load, and permits yields of 85 to 95% of theoretical.

1726 Separation of Benzene and *n*-Heptane in Continuous Thermal Diffusion Columns. T. S. Heines, O. A. Larson, and J. J. Martin. *Industrial and Engineering Chemistry*, v. 49, Nov. 1957, p. 1911-1920.

Effect of column height, spacing, feed rate, temperature gradient, and feed composition were studied in their relation to the separation attainable.

1727 Film Boiling of Flowing Subcooled Liquids. Eugene I. Motte and Leroy A. Bromley. *Industrial and Engineering Chemistry*, v. 49, Nov. 1957, p. 1921-1928.

Heat transfer coefficients outside single horizontal tubes were measured for upward flow forced convection film boiling of ethyl alcohol, benzene, hexane, and CCl_4. These values were increased markedly by subcooling the liquids below their boiling points.

1728* Boiler Water Treatment: A Formula for the Control of Sludge and Scale in Internal (Carbonate) Treatment. J. A. Gray. *Institute of Fuel, Journal,* v. 30, Oct. 1957, p. 577-584 + 4 plates.

1729* Liquid-Liquid Extraction. XII. Flooding Rates and Performance Data for a Rotary Disc Contactor. D. H. Logsdail, J. D. Thornton, and H. R. C. Pratt. **XIII. The Effect of Pulse Wave-Form and Plate Geometry on the Performance and Throughput of a Pulsed Column.** J. D. Thornton. **XIV. The Effect of Column Diameter Upon the Performance and Throughput of Pulsed Plate Columns.** D. H. Logsdail and J. D. Thornton. *Institution of Chemical Engineers, Transactions,* v. 35, no. 5, 1957, p. 301-342.

1730 Plant Practice in Granulation. T. P. Hignett and A. V. Slack. *Journal of Agricultural and Food Chemistry,* v. 5, Nov. 1957, p. 814-831.

An extensive survey of the granulation processes commonly used by the mixed fertilizer industry.

1731 Use of Ammoniating Solutions Containing Urea in Producing Granular Fertilizers. A. B. Phillips, G. C. Hicks, N. L. Spencer, and Julius Silverberg. *Journal of Agricultural and Food Chemistry,* v. 5, Nov. 1957, p. 834-839.

Comparison of ammoniating solutions containing urea with ammonia-ammonium nitrate solutions in the production of high-analysis granular fertilizers.

1732 Utilization of Calcium Metaphosphate in Production of Granular Fertilizers. A. B. Phillips, R. D. Young, J. S. Lewis, Jr., and Julius Silverberg. *Journal of Agricultural and Food Chemistry,* v. 5, Nov. 1957, p. 839-844.

A process was developed to increase the utility of calcium metaphosphate by increasing its water solubility and granulating it with other fertilizer components. The process consists of partially hydrolyzing calcium metaphosphate in the presence of a mineral acid and ammoniating the hydrolyzate in the continuous ammoniator.

1733* (Russian.) The Furfurals. **Furfurol.** N. P. Mel'nikov. *Khimicheskaia Nauka i Promyshlennost,* v. 11, no. 4, 1957, p. 425-431.

Furfural is a double bond heterocyclic aldehyde and is a very reactive substance used in synthesis of valuable products such as high-quality heat resistant and anticorrosive resins, synthetic drying oils, medical preparations, and plasticizers.

1734* (Russian.) Chromatographic Separation of Cracked Gasolines. **Khromatograficheskoe razdelenie benzina termicheskogo krekinga.** A. V. Topchiev, E. Kh. Iskhakova, I. A. Musaev, and G. D. Gal'pern. *Khimiia i Tekhnologiia Topliva, i Masel,* 1957, no. 11, Nov., p. 26-33.

Separation of 60 to 150 C fraction of gasoline into three hydrocarbon groups: saturated, unsaturated, and aromatic; a method of preparing silica gel appropriate for such separation.

1735* (Russian.) Application of Ultrasonics to the Production of Viscous Lubricants. **Primenenie ul'trazvuka pri poluchenii konsistentnykh smazok.** A. S. Ermilov. *Khimiia i Tekhnologiia Topliva, i Masel,* 1957, no. 11, Nov., p. 59-67.

Production of lubricants with soap thickening agents. Optimum parameters; homogenization; ultrasonic exposure for 2 to 10 min. at 245 to 250 C.

1736* (German.) A Graphic Approximation Process to Determine the Pressure Distribution in Gas Pipes .**Graphisches Näherungsverfahren zur Bestimmung des Druckverlaufes in gasdurchströmten Rohrleitungen.** Gerhard Hitschmann. *Maschinenbau und Wärmewirtschaft,* v. 12, no. 10, Oct. 1957, p. 288-293.

An approximation formula was set up by introducing the isotherm as a substitute for the adiabatic curve, and by equating the average specific volume with the final volume.

1737 Making Butadiene. II. Butylene Dehydrogenation by the Steam-Dilution Method. John C. Reidel. *Oil and Gas Journal,* v. 55, Dec. 2, 1957, p. 87 + 4 pages.

Details of basic commercial production process. Developments in catalysts.

1738 Petrochemical Handbook. *Petroleum Refiner,* v. 36, Nov. 1957, p. 193-304.

Flow charts of 95 manufacturing and 13 separation processes; an over-all outlook for the entire petrochemical industry; specific forecasts on eight important petrochemicals.

1739 Compressibility Factors at Low Pressures. H. W. Pfennig and John J. McKetta. *Petroleum Refiner,* v. 36, Nov. 1957, p. 309-312.

Experimental data for ethylene, propylene, and butene-1 up to 2 atm. pressure.

1740 Contact Efficiency Influences Design. VIII. Frederick A. Zenz. *Petroleum Refiner,* v. 36, Nov. 1957, p. 321-328.

Some typical fluid bed reactor designs for petroleum cracking, hydrocarbon synthesis, and nuclear power generation. An analytical comparison is drawn between the contact efficiency of fluidized and moving bed processes.

1741 Reports on the Progress of Applied Chemistry, v. XLI. 795 p. 1956. Society of Chemical Industry, London. (TP1 So13r Vis.)

Reviews developments in applied organic and inorganic chemistry, fuel and fuel products, metals, biological products, textiles, plastics, adhesives, paints, chemical engineering and hazards, and agriculture and food.

1742 Development of the Fischer-Tropsch Oil-Recycle Process. H. E. Benson, et al. *U. S. Bureau of Mines Bulletin* 568, 1957, 72 p. (TN21 Un3b)

Description of a pilot plant designed and constructed by the Bureau of Mines for using the Fischer-Tropsch process.

See also: **1605** (caking of fertilizers); **1731** (manufacture of fertilizer); **2251** (consumption and uses for Cl and NaOH); **2369** (manufacture and properties of H_2O_2); **2496** (corrosion in water purification plant); **2887** (control for extraction column); **3006** (petroleum refining air pollution control).

CHEMISTRY—ANALYTICAL

1743 Separation of Xylenes, Cymenes, Methylnaphthalenes and Other Isomers by Clathration With Inorganic Complexes. William D. Schaeffer, W. S. Dorsey, Davis A. Skinner, and C. G. Christian. *American Chemical Society, Journal,* v. 79, Nov. 20, 1957, p. 5870-5876.

1744 Acid-Base Equilibria in Glacial Acetic Acid. V. The Effect of Water on Potentiometric and Indicator End-Points in Acid-Base Titrations in Acetic Acid. S. Bruckenstein and I. M. Kolthoff. *American Chemical Society, Journal,* v. 79, Nov. 20, 1957, p. 5915-5921.

1745 Determination of Tocopherol in Oxidized Fats. E. N. Frankel, C. D. Evans, and J. C. Cowan. *American Oil Chemists' Society, Journal,* v. 34, Nov. 1957, p. 544-546.

Heating oxidized fats to 210 C under reduced pressure for 10 to 15 min. removed peroxides without affecting the tocopherol content. This method yielded a higher recovery of tocopherol in oxidized fats than other modifications of the Emmerie-Engel method used to remove interfering substances.

1746 Methods for the Determination of Tral, a New Anticholinergic Drug. Preston F. Helgren, James G. Theivagt, and Donald J. Campbell. *American Pharmaceutical Association, Journal, (Scientific Ed.),* v. 46, Nov. 1957, p. 639-643.

Procedures involving the combination of Tral with either bromthymol blue or ammonium cobaltothiocyanate to form a chloroform soluble complex require specific reaction conditions to assure maximum sensitivity and good reproducibility.

1747 Spectrophotometric Determination of Zinc and Other Metals With α, β, γ, δ-Tetraphenylporphine. Ramon Edward Bisque and Charles V. Banks. *Ames Laboratory (U. S. Atomic Energy Commission),* ISC-781, June 1956, 28 p. (UF767 Un3.1is Contin.)

Analytical procedures for the determination of trace amounts of Zn in various metals were developed utilizing the spectrophotometric properties of the Zn complex of α, β, γ, δ-tetraphenylporphine in glacial acetic acid.

1748* The Volumetric Determination of Tin in Titanium and Its Alloys. H. J. G. Challis and J. T. Jones. *Analyst*, v. 82, Oct. 1957, p. 658-663.

Involves the direct reduction of tin with hypophosphite and volumetric determination with potassium iodate. Method is satisfactory for amounts of tin above 0.2%.

1749* The Use of Paper Chromatography for the Detection and Determination of Microgram Amounts of Inorganic Fluoride. R. J. Hall. *Analyst*, v. 82, Oct. 1957, p. 663-667.

A staining method for as little as one microgram of isolated fluoride (as CaF_2) is described.

1750* (English.) The Use of Naphthalene Derivatives in Inorganic Analysis. II. The Nitronaphthylamines as New Reagents for Mercuric Mercury and Ceric Cerium. J. L. Garnett and L. C. Lock. *Analytica Chimica Acta*, v. 17, no. 4, Oct. 1957, p. 351-355.

Use of 4-nitro-1-naphthylamine as a spot test for mercuric Hg and 1-nitro-2-naphthylamine as a spot test for ceric Ce.

1751* (English.) A Systematic Scheme of Qualitative Analysis for Anions. I-II. I. K. Taimni and Manohar Lal. *Analytica Chimica Acta*, v. 17, no. 4, Oct. 1957, p. 367-378.

Scheme is based on the precipitation of difficultly-soluble salts of anions in groups by basic group reagents in sodium carbonate solution and the subsequent analysis of each group precipitate or filtrate for the detection of individual members of the group.

1752* (English.) Determination of Methyl Ketons by pH Measurement. M. H. Hashmi. *Analytica Chimica Acta*, v. 17, no. 4, Oct. 1957, p. 383-385.

Method depends upon the measurement of pH after the liberation of free HCl in the hydroxylamine hydrochloride reaction.

1753* (English.) A Simplified and Extended Scheme of Analysis for the Common Cations, Based on Paper Chromatography. I. I. M. Elbeih and M. A. Abou-Elnaga. *Analytica Chimica Acta*, v. 17, no. 4, Oct. 1957, p. 397-407.

1754* (English.) Studies in Polarographic Analysis. I. Determination of Manganese After Oxidation to the Manganic State Stabilized by Triethanolamine. *Analytica Chimica Acta*, v. 17, no. 4, Oct. 1957, p. 434-439.

1755 Analytical Microscopy. Its Aims and Methods in Relation to Foods, Water, Spices and Drugs. T. E. Wallis. 2nd Ed. 215 p. 1957. J. & A. Churchill, Ltd., London. (QH205 W15a2)

Methods of preparing materials for microscopical examination.

1756* (German.) Determination of Small Titanium Contents in Iron Alloys and Ores After Separation of the Heavy Metal With Pyrrolidine Dithiocarbamate. **Die Bestimmung kleiner Titangehalte in Eisenlegierungen und Erzen nach Abtrennung der Schwermetalle mit Pyrrolidindithiokarbamat.** Ernst Schöffmann and Hanns Malissa. *Archiv für das Eisenhüttenwesen*, v. 28, Oct. 1957, p. 623-624.

Description of a process using pyrrolidine dithiocarbamic acid and chloroform for the determination of Ti as peroxytitanyl ion. Application to iron ores, crude iron, unalloyed and alloy steel, even in the presence of V and W.

1757* (German.) Quantitative Examination of Alloy Elements in Steel by Means of the X-Ray Fluorescence Spectrum Analysis. **Quantitative Ermittlung von Legierungselementen im Stahl mit der Röntgen - Fluoreszenz - Spektralanalyse.** Hans Krächter and Willi Jäger. *Archiv für das Eisenhüttenwesen*, v. 28, Oct. 1957, p. 633-639.

Formation of fluorescent X-rays. Use of a goniometer. Preparation of specimens, effects of thickness and measuring time. Measurements on Cr and Cr-Mo steel. Comparison with the optical method.

1758 Apparatus for Determination of Hydrogen in Steel. L. Bjerkerud. *Henry Brutcher Translation No.* 4027, 7 p. (From *Jernkontorets Annaler*, v. 141, no. 2, 1957, p. 90-94.) Henry Brutcher, Altadena, Calif.

1759 Sampling of Steel for Determination of Hydrogen Content. L. Bjerkerud. *Henry Brutcher Translation No.* 4028, 10 p. (From *Jernkontorets Annaler*, v. 141, no. 2, 1957, p. 94-99.) Henry Brutcher, Altadena, Calif.

Particulars on various possible ways of taking steel samples from the ladle or from bottom- or top-poured ingots and of handling them after their solidification in a mold. Recommended procedures.

1760 Colorimetric Determination of Aluminum With the New Reagent "Stilbazo". V. I. Kuznetsov, G. G. Karanovich, and D. A. Drapkina. *Henry Brutcher Translation No.* 4036, 16 p. (From *Zavodskaia Laboratoriia*, v. 16, no. 7, 1950, p. 787-792.) Henry Brutcher, Altadena, Calif.

With stilbazo it is possible to determine 0.1-5 γ of Al in 5 ml. colorimetrically, against a reference color scale or by colorimetric titration.

1761* Infra-Red—An Indispensible Tool. *Canadian Chemical Processing*, v. 41, Nov. 1957, p. 134 + 4 pages.

Industrial applications of infra-red analysis.

1762 Determination of Lead by Dithizone in a Single Phase Water-Acetone System. D. G. M. Diaper and A. Kuksis. *Canadian Journal of Chemistry*, v. 35, Nov. 1957, p. 1278-1284.

By working in an aqueous acetone system (70% acetone by volume) the usual extraction step is avoided.

1763 An Ionization Gauge Detector for Gas Chromatography. S. A. Ryce and W. A. Bryce. *Canadian Journal of Chemistry*, v. 35, Nov. 1957, p. 1293-1297.

Gage combines very high sensitivity and rapid response with almost complete independence of changes in flow rate, pressure, or temperature.

1764* (French.) Coulometric Determination of the Oxidizability of Water. **Détermination coulométrique de l'oxydabilité d'une eau.** J. Hissel. *Centre Belge d'Etude et de Documentation des Eaux, Bulletin (Trimestrielle)*, 1957, no. 37, p. 169-174 + 2 plates.

Determinations using Ce^{4+} as the oxidizer followed by boiling for 2½ hrs. in a flask equipped with a reflux condenser.

1765* (French.) Rapid Polarographic Determinations of Copper, Nickel, and Chromium in Steel. **Dosages polarographiques du cuivre, du nickel et du chrome dans les aciers.** E. Jaudon. *Centre de Documentation Siderurgique, Circulaire d'Informations Techniques*, v. 14, no. 10, 1957, p. 2075-2079.

1766* (French.) Determinations of Manganese and Nickel by Colorimetry. **Dosages du manganèse et du nickel par colorimétrie.** A. Serres. *Centre de Documentation Siderurgique, Circulaire d'Informations Techniques*, v. 14, no. 10, 1957, p. 2081-2084.

A rapid method for determination of Mn in high speed steels and steels with high Cr content.

1767* (French.) Colorimetric Determination of Silica in the Presence of Phosphoric Ions. Application to Sodium Phosphates. **Dosage colorimétrique de la silice en presénce d'ions phosphoriques. Application aux phosphates de sodium.** Pierre Désiré. *Chaleur & Industrie*, v. 8, no. 387, Oct. 1957, p. 271-276.

1768* (English.) Photometric Determination of Thallium With Rhodamine B. Hiroshi Onishi. *Chemical Society of Japan, Bulletin*, v. 30, no. 6, Sept. 1957, p. 567-571.

For separation from other elements, univalent Tl is extracted with dithizone in chloroform from a basic solution containing cyanide and then transferred to an aqueous solution by shaking the chloroform with dilute HNO_3.

1769* (English.) Carrier-Free Separation of Cesium From Fission Products by the Use of Coprecipitation With Thallium(I) Dipicrylaminate. Noboru Yamagata and Sadakata Watanabe. *Chemical Society of Japan, Bulletin*, v. 30, no. 6, Sept. 1957, p. 580-583.

Method makes use of coprecipitation with thallium(I) dipicrylaminate followed by solvent extraction with methylisobutyl ketone in the presence of HCl and an oxidizing agent.

1770 Submicro-Methods for the Analysis of Organic Compounds. I. The Determination of Nitrogen. R. Belcher, T. S. West, and M. Williams. *Chemical Society, Journal*, 1957, Oct., p. 4323-4328.

Nitrogen is determined by decomposing a sample, about 50μg., in a sealed tube and titrating the ammonia thus formed with a standard solution NaClO.

1771* Gas Analysis by Infra-Red Aids Process Automation. Nelson W. Hartz. *Chemistry in Canada,* v. 9, Oct. 1957, p. 47 + 2 pages.

An outline of instruments and techniques.

1772* (Italian.) Coulometric Determination of Mercaptans Separated by Gas Chromatography. **Determinazione coulombometrica di mercaptani separati mediante cromatografia in fase gassosa.** Arnaldo Liberti and Gian Paolo Cartoni. *Chimica e l'Industria,* v. 39, no. 10, Oct. 1957, p. 821-824.

Separation, identification, and quantitative determination by chromatography and automatic coulometric titration of single constituents by anodic generation of Ag ions.

1773* (French.) Remarks on the Determination of Potash in Mixed Fertilizers by Means of Flame Photometry. **Remarques sur le dosage de la potasse, dans les engrais composés, par la photométrie de flamme.** Pierre H. Martens. *Chimie Analytique,* v. 39, no. 10, Oct. 1957, p. 361-365.

The results obtained from photometry were influenced partly by the presence of Ca^{++} and PO_4^{---} ions. Correction by means of triangular graphs.

1774* (French.) Some Applications of Chromatography in the Field of Organic Acids. **Quelques applications de la chromatographie dans le domaine des acides organiques.** J. Asselineau. *Chimie Analytique,* v. 39, no. 10, Oct. 1957, p. 375-383.

Isolating the acid fraction from a complex mixture. Adsorption and ion exchange chromatography. Separation of acids from each other or from a homologous series. Acid identification.

1775 Electronics Controls Gas Chromatography. Walt Donner. *Electronics,* v. 30, Nov. 1, 1957, p. 164-166.

Heat-controlled instrumentation system, with thermistor as temperature sensing element, automatically maintains any preset temperature between 40 and 225 C within a thermal compartment.

1776* (German.) Infra-Red Spectroscopic Analysis of Alkyl Benzenes. **Ultrarotspektroskopische Analyse von Alkylbenzolen.** Klaus-Dietrich Ledwock. *Erdöl und Kohle,* v. 10, no. 9, Sept. 1957, p. 595-596.

Intensity measurements of infra-red 1605 K absorption bands lead to a simple relationship between a^1 and the molecular composition of mono-*n*-alkyl benzenes. The ϵ values of the homologous series are constant, except for the first two elements.

1777* (German.) Indication and Quantitative Determination of Polyalkylene Oxides With Sodium Tetraphenylborate. **Der Nachweis und die quantitative Bestimmung von Polyalkylenoxyden mit Natrium-tetraphenyloborat.** R. Neu. *Fette, Seifen, Anstrichmittel,* v. 59, no. 10, Oct. 1957, p. 823-826.

Usefulness of the method is demonstrated with eight products of mol. wts. from 200 to 12,000. Method is applicable to other substances.

1778 Purification and Determination of Uranium in Impure Solutions Using Versene. O. A. Vita, C. F. Trivisonno, and F. S. Voss. *Goodyear Atomic Corporation (U. S. Atomic Energy Commission),* GAT-186, July 1956, 12 p. (UF767 Un3.1ga Contin.)

Method consists of chelating all the cations with Versene or its derivatives and precipitating the U selectively with ammonium dibasic phosphate. The precipitated U is separated by centrifugation and is determined colorimetrically by the basic peroxide method.

1779 Works Laboratory Procedures. v. II. *Goodyear Atomic Corporation, U. S. Atomic Energy Commission, Research and Development Report* GAT 115 (Rev.) Jan. 1957, sections individually paged. (UF767 Un3.1ga Contin.)

Collection of laboratory procedures for analysis of coal, inorganic substances, water, and other materials.

1780 Freezing Point Determinations of the Uranium Hexafluoride-Hydrogen Fluoride System. H. L. Bullard, A. S. Ostroski, and W. S. Stringham. *Goodyear Atomic Corporation, U. S. Atomic Energy Commission, Research and Development Report,* GAT-213, Oct. 1957, 14 p. (UF767 Un3.1ga Contin.)

Method and apparatus for production analysis of HF in UF_6.

1781 An Apparatus for the Determination of Total Gas in Fuel Element Samples. R. I. Miller. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-51452, July 1957, 13 p. (UF767 Un3.1hw Contin.)

Details of apparatus capable of analyzing six U samples per 8 hrs. for total gas content.

1782 Recent Developments in Polarographic Analysis. G. W. C. Milner and L. J. Slee. *Industrial Chemist,* v. 33, Oct. 1957, p. 494-500.

Characteristics of derivative, cathode ray, and a.c. polarography; advantages offered by the square wave polarograph and its applications.

1783 Coulometric Analysis. L. E. Smythe. *Industrial Chemist,* v. 33, Oct. 1957, p. 501-505.

Principles of coulometry at controlled potential and coulometric titrations.

1784 Analysis for Industry. II. Laszlo Erdey. *Industrial Chemist,* v. 33, Oct. 1957, p. 523-525.

Practical applications of lucigenine and luminol as chemiluminescent indicators. (To be continued.)

1785 The Separation of Mixtures of Biphenyl, *cyclo*hexylbenzene, and Bi*cyclo*hexyl by Vapour-Phase Chromatography. W. J. Hendriks, R. M. Soemantri, and H. I. Waterman. *Institute of Petroleum, Journal,* v. 43, Oct. 1957, p. 288-291.

1786* (German.) Study of the Separation of Rare Earths. **Beiträge zur Trennung der Seltenen Erden. IV.** Further Investigations of Rare Earth Separation by Complex Adsorption Through Cation-Exchange With β-Oxyethyliminodiacetic Acid. **Weitere Untersuchungen über die Trennung Seltener Erden durch Komplexelution vom Kationenaustauscher mittels β-Oxyäthyliminodiessigsäure. V.** Further Investigations of the Separation of Rare Earths by Complex Adsorption Through Cation-Exchange Resins. (Elution by Means of 4% β-Oxyethyliminodiacetic Acid Solution at 70 C). **Weitere Untersuchungen über die Trennung Seltener Erden durch Komplexelution vom Kationenharzaustauscher (die Elution mittels 4 proz. β-Oxyäthyliminodiessigsäurelösung bei 70°C).** Leopold Wolf and Joachim Massonne. *Journal für Praktische Chemie,* v. 5, nos. 1-2, Oct. 1957, p. 14-33.

1787 Health Physics Manual of Radiochemical and Chemical Analyses and Procedures. M. R. Kennedy. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission),* KAPL-A-HP-3, May 1957, 70 p. (UF767 Un3.1ka Contin.)

Quantitative analytical procedures. Preparation of reagents; chemical recoveries; counting; calculations.

1788 Estimation of B-10 Burnup by Flame Photometric Lithium Determination. D. Dutina. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission),* KAPL-1786, May 1957, 18 p. (UF767 Un3.1ka Contin.)

Method by which the B-10 burnup in stainless steel, Zr, and Zircaloy samples can be determined by flame photometric analysis of the Li produced by neutron irradiation.

1789 The Rapid Analysis of Steelmaking Slags. S. Muir and A. D. Ambrose. *Metallurgia,* v. 56, no. 337, Nov. 1957, p. 255-257.

Analysis involves solution by fusion in a mixture of Na_2CO_3 and borax followed by extraction in dilute HNO_3 and H_2O_2. A subsequent spectrographic technique is outlined.

1790* (Italian.) Simplified Equipment for Determining Hydrogen in Steel. **Apparecchiatura semplificata per il dosamento dell'idrogeno nell'acciaio con il metodo di estrazione a 600°.** E. Marianeschi and R. Coletti. *Metallurgia Italiana,* v. 49, no. 9, Sept. 1957, p. 673-676.

The classical system of vacuum extraction at 650 C is modified so that the amount of H extracted from the sample is measured by the variation of pressure detected in the constant-volume extraction chamber when degassing the sample.

1791 Raw Materials Development Laboratory Handbook of Analytical Methods. Michael A. DeSesa. *National Lead Company, Inc., Raw Materials Development Laboratory (U. S. Atomic Energy Commission)*, TID-7002 (Rev.) July 1957, 140 p. (UF767 Un3ti Contin.)

Collection of analytical methods for testing raw materials associated with U processing, compiled after a previous evaluation of their effectiveness.

1792 Ring Microchemistry. A New Analytical Method. W. I. Stephen. *Research*, v. 10, Nov. 1957, p. 429-436.

An investigation of the applications of the ring oven method for the microanalysis of inorganic substances. Technique provides a simple means of separating substances or groups of substances contained in a single drop of solution.

1793 Precision Thermal-Conductivity Gas Analyzer Using Thermistors. R. E. Walker and A. A. Westenberg. *Review of Scientific Instruments*, v. 28, Oct. 1957, p. 789-792.

1794* (English.) **Spectrographic Determination of Microamounts of Arsenic, Antimony, Bismuth, Tin and Lead.** Yû Yokoyama. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 9, no. 5, Oct. 1957, p. 419-425.

After $CaNO_3$ (used as the spectroscopic buffer) and $CdNO_3$ (used as the internal standard) were added to the sample solution, it was evaporated and a part of the nitrate salt deposited was excited in the cavity of a graphite electrode by d.s. arc method with a medium quartz spectrograph.

1795 (German.) Summary of the Present State of the Spectrometrical Analysis of Steel. **Überblick über den Stand der spektrometrischen Stahlanalyse.** Gerhard Hartleif. *Stahl und Eisen*, v. 77, no. 21, Oct. 17, 1957, p. 1497-1499.

Determination of C, P, S, and of the gases in steel; preparation of samples; selection of spectral lines.

1796* Wet Combustion of Organic Substances With Iodic Acid. III. Oxygen Consumed and Carbon Dioxide Formed in Total Combustion. A Means for Characterizing Lignin Preparations. Theodor N. Kleinert and Rose-Marie Dlouhy. *Tappi*, v. 40, Oct. 1957, p. 827-829.

1797* (Norwegian.) Methods for Rapid Chemical Analysis of Silicates. **Systemer for hurtig kjemisk analyse av silikater.** Finn J. Langmyhr. *Tidsskrift for Kjemi, Bergvesen og Metallurgi*, v. 17, no. 8, 1957, p. 125 + 3 pages.

1798* (Russian.) Potentiometric Titration of Salts in Differentiating Solvents. **Potentsiometricheskoe titrovanie solei v differentsiruiushchikh rastvoriteliakh. I.** Argentometric Titration of Salt Mixtures With a Single Anion. **Argentometricheskoe titrovanie smesei solei s odnim anionom.** N. A. Izmailov and E. I. Vail'. *Ukrainskii Khimicheskii Zhurnal*, v. 23, no. 5, 1957, p. 662-668.

A separate titration in acetone and acetonitrile by the argentometric method of the following systems was made: HBr-KBr, HBr-NaBr, HBr-LiBr, HBr-NH_4Br, $(CH_3)_4$NBr-HBr, $(CH_3)_4$NBr-KBr, $(CH_3)_4$NBr-NaBr, $(CH_3)_4$NBr-NH_4Br, $(CH_3)_4$NBr-CH_3NH_2Br - NaBr, $(CH_3)_4$NBr - $CH_3(NH_3)$Br, $(C_2H_5)_4$NBr-$(C_2H_5)NH_2$Br, HI-Ki, HI-NaI, Hi-NH_4I, HI-$(CH_3)_4$NI, $(CH_3)_4$NI-KI, $(CH_3)_4$NI-NaI, $(CH_3)_4$NI-NH_4I, and Na_2S-H_2S.

1799 Modern Approaches to Isotopic Analysis of Uranium. *U. S. Atomic Energy Commission*, TID-7531, pt. 1, Oct. 1957, 178 p. (UF767 Un3ti Contin.)

Fifteen papers on different analytical methods.

1800* (Russian.) Analysis of Pure Metals. **Analiz chistykh metallov.** V. A. Nazarenko. *Zavodskaia Laboratoriia*, v. 23, no. 10, Oct. 1957, p. 1162-1167.

Radioactivation, spectral (including flame photometry), and chemical analyses, and colorimetry or polarography as methods for determining micro-impurities in metals.

1801* (German.) Photometric Determination of Antimony in Pure and Electrolytic Copper. **Photometrische Antimonbestimmung in Rein- und Elektrolytkupfer.** Charles M. Dozinel. *Zeitschrift für Analytische Chemie*, v. 157, no. 6, 1957, p. 401-405.

The limit of determination in about 0.5 g. of weighed metal was in the order of between 1 and 30 g. Sb per ton (0.0001 and 0.0030%).

1802* (German.) Testing the Purity of Amino Acid Preparations. **Über die Reinheitsprüfung von Aminosäurepräparaten.** E. Schulek and Z. L. Szabó. *Zeitschrift für Analytische Chemie*, v. 157, no. 6, 1957, p. 405-411.

The substance examined was separated from extraneous amino acids by paper chromatography. In the developed amino acid spots the N content, and from there, the amount of amino acids, were determined. When no foreign amino acid was found, the preparation was paper chromatographically pure.

1803* (English.) **Fast Grey R.A. as a New Colorimetric Reagent. II. Spectrophotometric Microdetermination of Copper.** H. Khalifa. **III. Microdetermination of Vanadium.** H. Khalifa and A. Farag. *Zeitschrift für Analytische Chemie*, v. 158, no. 2, 1957, p. 103-115.

1804* (German.) Indirect Determination of Molybdenum by Quantitative Analysis With Ethylenediaminetetraacetic Acid. **Zur indirekten massanalytischen Bestimmung des Molybdäns mit Äthylendiamintetraessigsäure.** E. Lassner and H. Schlesinger. *Zeitschrift für Analytische Chemie*, v. 158, no. 3, 1957, p. 195-198.

Determination of Mo by indirect complexometric titration. Procedure involves precipitation of the molybdate with $CaCl_2$ and solution of the precipitate, followed by retitration with a Mg solution.

1805* (German.) Separation of Phosphates by Means of Paper Electrophoresis. **Trennung von Phosphaten durch Papierelektrophorese. V.** High Tension Paper Electrophoresis of Condensed Phosphates and Metaphosphate. **Hochspannungspapierelektrophorese kondensierter Phosphate und Metaphosphate.** Bruno Sansoni and Ludwig Baumgartner. *Zeitschrift für Analytische Chemie*, v. 158, no. 4, 1957, p. 241-251.

Separation of inorganic ions; examination of unstable ions with half life periods less than 1 hr. Rapid separation of phosphates and metaphosphate.

1806* (Russian.) The Development of Investigations in Analytical Chemistry in the USSR. **Razvitie issledovanii po analiticheskoi khimii v SSSR.** A. P. Vinogradov. *Zhurnal Analiticheskoi Khimii*, v. 12, no. 5, Sept.-Oct. 1957, p. 575-577.

Historical survey of advances in the USSR.

1807* (Russian.) Use of Radioactive Isotopes in Analytical Chemistry. **Primenenie radioaktivnykh izotopov v analiticheskoi khimii.** I. P. Alimarin and N. A. Pudnev. *Zhurnal Analiticheskoi Khimii*, v. 12, no. 5, Sept.-Oct. 1957, p. 587-592.

Historical survey.

1808* (Russian.) Radiometric Methods of Analysis. **Radiometricheskie metody.** B. I. Baranov. *Zhurnal Analiticheskoi Khimii*, v. 12, no. 5, Sept.-Oct. 1957, p. 600-605.

Survey of advances in the study of substances by means of radiation and transformation of the radioactive substances.

1809* (Russian.) Electrochemical Methods of Analysis. **Elektrokhimicheskie metody analiticheskoi khimii.** M. T. Kozlovskii. *Zhurnal Analiticheskoi Khimii*, v. 12, no. 5, Sept.-Oct. 1957, p. 623-628.

Discusses existing methods with emphasis on polarography, and important work done in this field.

1810* (Russian.) Analytical Chemistry of the Actinides. **Analiticheskaia khimiia aktinoidov.** P. N. Palei. *Zhurnal Analiticheskoi Khimii*, v. 12, no. 5, Sept.-Oct. 1957, p. 647-664.

Reactions and properties of the actinide elements; chemical methods for their separation and identification.

1811* (Russian.) The Partition Chromatographic Method for the Separation and Determination of Hydrocarbon Gases. **Raspredelitel'nyi khromatograficheskii metod razdeleniia i analiza uglevodorodnykh gazov.** N. M. Turkel'taub. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 9, Sept. 1957, p. 2102-2109.

Theoretical and experimental investigations in the domain of partition gas chromatography; the role of the carrier and the nature of the fixed phase.

See also: **1654** (biochemical analysis); **1734** (chromatographic separation of gasoline); **2091** (infra-red process stream analyzers); **2293** (determination of sorbic acid); **2307** (spectral analysis of coal ashes); **2418**

(analysis of wear surfaces); **2812** (nuclear induction spectrometer); **2894** (analysis of Al-U fuel elements); **2895** (analysis of Zr-U fuel elements); **2965** (plastic vessels for analytical work); **3014** (determination of color and turbidity of water); **3054** (analysis of pulping liquor); **3062** (determination of Cu in fabrics).

CHEMISTRY—INORGANIC AND GENERAL

1812 The Preparation of a Barium Cobalt Oxide and Other Phases With Similar Structures. Beatrice E. Gushee, Lewis Katz, and Roland Ward. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5601-5603.

Preparation of anion deficient ternary oxides of Ba and the transition metals Fe, Co, and Ni having the approximate formulas $BaFeO_{2.72}$, $BaCoO_{2.83}$, and $BaNiO_{2.5}$.

1813 The Complexes of Magnesium Ion With Pyrophosphate and Triphosphate Ions. Sheldon M. Lambert and James I. Watters. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5606-5608.

1814 Trifluoromethyl Hypofluorite: Its Decomposition and Its Reaction With Carbonyl Fluoride to Form Perfluorodimethyl Peroxide. Roger S. Porter and George H. Cady. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5628-5631.

1815 The Stereochemistry of Complex Inorganic Compounds. XXI. The Resolution of Racemic Substances Through Optically Active Complex Inorganic Compounds. Stanley Kirschner, Yung-Kang Wei, and John C. Bailar, Jr. *American Chemical Society, Journal*, v. 79, Nov. 20, 1957, p. 5877-5880.

1816 Neopentyl Group Analogs. I. The Preparation and Some Cleavage Reactions of Trimethylsilylmethyl-Substituted Tin Compounds. Dietmar Seyferth. *American Chemical Society, Journal*, v. 79, Nov. 20, 1957, p. 5881-5884.

Preparation of $Me_3SiCH_2SnMe_3$, $(Me_3SiCH_2)_4Sn$, and $(ME_3SiCH_2)_2SnR_2$ (R=Me, Vi, *n*-Bu, C_6H_5) by the Grignard reaction in tetrahydrofuran solution. Cleavage with I, Br, HBr, $HgBr_2$, and trifluoroacetic acid.

1817 Vinyl Derivatives of the Metals. VI. Preparation, Properties and Some Reactions of Trivinyl Compounds of Group V Elements. Ludwig Maier, Dietmar Seyferth, F. G. A. Stone, and Eugene G. Rochow. *American Chemical Society, Journal*, v. 79, Nov. 20, 1957, p. 5884-5889.

Data on P, As, Sb, and Bi compounds.

1818 An X-Ray Study of Titanium Tetrabromide, Titanium Tetraiodide and Titanium Triiodide. Robert F. Rolsten and Harry H. Sisler. *American Chemical Society, Journal*, v. 79, Nov. 20, 1957, p. 5891-5893.

X-ray diffraction data. Evidence that TiI_4 undergoes a crystal transformation in the temperature range 100 to 125 C.

1819* (German.) Crystal Structure Analysis by X-Rays as a Means for the Determination of Chemical Constitution Formulas. **Die Röntgenkristallstrukturanalyse als Methode zur Bestimmung der chemischen Konstitution.** W. Hoppe. *Angewandte Chemie*, v. 69, no. 21, Nov. 7, 1957, p. 659-674.

Laws inherent in X-ray structural analysis are demonstrated for the simple one-dimension case, together with new methods for solution of more complicated structural analyses. Basic mathematical principles.

1820* (English.) **Existence of Nitrous Oxide in Gases Produced From Nitrogen Compounds Decomposed by the Strong Phosphoric Acid-Iodic Acid Method.** Shigeru Ohashi, Yuzi Takayama, Hiroshi Higashidani, and Sachiko Taki. *Chemical Society of Japan, Bulletin*, v. 30, no. 6, Sept. 1957, p. 604-606.

1821 The Chemistry of Quadrivalent Germanium. V. Ion-Exchange Studies of Germanate Solutions Containing Polyhydric Alcohols. D. A. Everest and J. C. Harrison. *Chemical Society, Journal*, 1957, Oct., p. 4319-4323.

Solutions containing ethylene glycol, glycerol, and mannitol were studied over the pH range 6-12 with Amberlite I.R.A. 400-Cl.

1822 Isotopic Tracer Investigations of Mechanism and Structure in Inorganic Chemistry. D. R. Stranks and R. G. Wilkins. *Chemical Reviews*, v. 57, Oct. 1957, p. 743-866.

Isotopic exchange reactions; factors influencing choice of a tracer isotope; exchange reactions in the detection of equilibria; exchange reactions and molecular structure; rates and mechanisms of exchange of complexes of the transitional elements; tracing "tagged" atoms through chemical reactions.

1823* (German.) Aromatic Complexes of Metals. **Über Aromatenkomplexe von Metallen. XVII.** Rhenium (I)-Complexes of Benzenes and Mesitylenes. **Rhenium (I)-Komplexe des Benzols und Mesitylens.** Ernst Otto Fischer and Anton Wirzmüller. *Chemische Berichte*, v. 90, no. 9, 1957, p. 1725-1730.

The reaction of the $ReCl_5$-$AlCl_3$-Al system with mesitylene at 130 C under N in a reflux condenser or under benzene in a pressure tube was studied.

1824* (French.) Study of a Series of Isomorphous Phosphosulfates of Eulytine. **Étude d'une série de phosphosulfates isomorphes de l'eulytine.** André Durif. *Comptes Rendus*, v. 245, Sept. 30, 1957, p. 1151-1152.

Description of nine compounds of the formula $(PO_4)_2Pb_3SO_4M$ (M=bivalent metal), each isomorphic with eulytine.

1825 Nitrogen Derivatives of Phosphorus and Sulfur. L. F. Audrieth. *Journal of Chemical Education*, v. 34, Nov. 1957, p. 545-555.

A survey of recent experimental developments.

1826 (French.) Chemical Effects of Ionizing Radiations on Aqueous Vanadium Solutions. **Effets chimiques des radiations ionisantes sur les solutions aqueuses de vanadium. I.** Reduction of Pentavalent Vanadium in Acid Medium by Radiocobalt γ Rays. **Réduction du vanadium pentavalent en milieu acide par les rayons γ du radiocobalt.** Jacques Pucheault and Christiane Ferradini. *Journal de Chimie Physique*, v. 54, Sept. 1957, p. 659-668.

Effect of γ-radiation on sulfate solutions of sodium orthovanadate. Reduction of V is proportional to the amount of energy absorbed.

1827 The Thermal Decomposition of Yttrium, Scandium, and Some Rare-Earth Chloride Hydrates. Wesley W. Wendlandt. *Journal of Inorganic and Nuclear Chemistry*, v. 5, no. 2, 1957, p. 118-122.

The salts began to lose water of hydration in the 55 to 110 C range. Horizontal weight levels were found in the decomposition curves which corresponded to the 1-hydrate, metal oxychloride, and in some cases the metal oxide. The thermal decomposition product, in all cases except Sc and Ce was the metal oxychloride.

1828 Phosphates and Polyphosphates of the Rare-Earth Elements. I. The Hydrogen Ion Displacement Method for the Characterization of the Phosphates and Polyphosphates of Some Rare Earths. A. G. Buyers, E. Giesbrecht, and L. F. Audrieth. *Journal of Inorganic and Nuclear Chemistry*, v. 5, no. 2, 1957, p. 133-140.

1829* Recovery of Nickel From Spent Nickel Catalyst. K. E. Bharucha, J. G. Kane, and D. Rebello. *Journal of Scientific & Industrial Research*, v. 16, sec. A, Sept. 1957, p. 415-419.

Recovery is 90-93% when using minimum quantities of an inorganic acid such as H_2SO_4, HNO_3, or HCl. About 89% Ni is recovered by using formic acid while the recovery with acetic acid is only 68%. A method is described for the purification of the recovered Ni compound and subsequent preparation of nickel formate.

1830* (English.) **Preparation of Titanium Tetrachloride. Some Experiments for the Determination of Its Mechanism.** Kenji Okazaki, Joichiro Moriyama, and Isao Kushima. *Kyoto University, Memoirs of the Faculty of Engineering*, v. 19, no. 3, July 1957, p. 291-301.

Studies of chlorination under varying conditions.

1831 (Hungarian.) The Thermal Decomposition of Silver Oxalate. **Az ezüstoxalát termikus bomlása.** Zoltán Szabó and Sugár Edit Bíróné. *Magyar Kémiai Folyóirat*, v. 63, no. 9, Sept. 1957, p. 252-263.

A study of the thermal decomposition of high purity preparations of silver oxalate in the absence of different gases. Kinetic curves are based on the principle of the "four stage" mechanism. Propagation in the form of a splitting chain reaction.

1832* (German.) Intermediate Stages in the Development of Magnesium Aluminate From Magnesium Oxide and Aluminum Oxide, and in the Development of Magnesium Ferrite From Magnesium Oxide and Iron(III) Oxide, Followed by Hahn's Emanation Method. **Über die Zwischenzustände bei der Bildung von Magnesium-aluminat aus Magnesiumoxyd und Aluminiumoxyd und bei der Bildung von Magnesiumferrit aus Magnesiumoxyd und Eisen(III)-oxyd, verfolgt mit der Hahnschen Emaniermethode.** G. F. Hüttig, R. Reidlinger, and G. Glawitsch. *Monatshefte für Chemie*, v. 88, no. 4, 1957, p. 639-645.

1833 F^{18} Exchange Between Fluorocarbons and Some Fluorine-Containing Compounds. T. A. Gens. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2363, Oct. 1957, 117 p. (UF767 U3o Contin.)

1834* (Polish.) Gas Hydrates. **Gazohydraty.** Andrzej Czapliński. *Wiadomości Chemiczne*, v. 11, no. 8, Aug. 1957, p. 417-442.

Composition and structure of a large number of hydrades of gaseous elements and radicals. Theory of hydrate formation. Effect of lattice expansibility on hydrate solidity.

1835* (English.) **Formation of Complex Compounds Between Potassium Chloride and Alkaline Earth Chlorides. VI. System: KCl-$CaCl_2$-H_2O.** L. N. Srivastava and P. C. Bose. *Zeitschrift für Physikalische Chemie (Leipzig)*, v. 207, nos. 3-4, Aug. 1957, p. 180-186.

Rheochor, parachor, and specific refraction of a series of mixed solutions of KCl and $CaCl_2$ were calculated.

1836* (Russian.) Trivalent Uranium Oxychloride. **Ob oksikhloride trekhvalentnogo urana.** S. A. Shchukarev and A. I. Efimov. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 10, Oct. 1957, p. 2304-2306 + 1 plate.

Production of uranium oxymonochloride (UOCl), its properties and crystal structure.

1837* (Russian.) Solubility of the $Na_4UO_8 \cdot 9H_2O$ Salt in Water and in Different Electrolyte Solutions. **Rastvorimost' soli $Na_4UO_8 \cdot 9H_2O$ v vode i rastvorakh razlichnykh elektrolitov.** A. P. Ratner, A. M. Gurevich, and L. P. Polozhenskaia. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 10, Oct. 1957, p. 2316-2322.

Optimum conditions for the production of $Na_4UO_8 \cdot 9H_2O$ X-ray study of crystal structure. Balance at 25 C between the solid phase and the saturated solution of the salt in water, NaOH, and HNO_3 solutions.

1838* (Russian.) Investigation of Products of Decomposition of the $Na_4UO_8 \cdot 9H_2O$ Salt. **Issledovanie produktov razlozheniia soli $Na_4UO_8 \cdot 9H_2O$.** L. P. Polozhenskaia. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 10, Oct. 1957, p. 2323-2326.

Formation of the difficultly soluble salts of $Na_2U_4O_9 \cdot 6H_2O$, $Na_3U_4O_{12} \cdot 3H_2O$, and $Na_7HU_4O_{12} \cdot 21H_2O$.

1839* (Russian.) Thallium Ferrocyanides. **O ferrotsianidakh talliia. IV.** Thallium Ferrocyanides Combined With Lanthanum and Cerium. **Smeshannye ferrotsianidy talliia s lantanom i tseriem.** *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 10, Oct. 1957, p. 2475-2482.

Investigation of the reaction of La^{3+} or Ce^{3+} ions with Tl^+ ions in the presence of $[Fe(CN)_6]^{4-}$ ions. Because of the solubility of $Tl_4[Fe(CN_6)]$, La, Ce, Tl, and $Li^+[Fe(CN)_6]$ nitrates were used.

CHEMISTRY—ORGANIC

1840* (English.) **Syntheses of Some Thiolacetic Acid Derivatives. I. Trichlorothiolacetic Acid.** Bertil Sjöberg. *Acta Chemica Scandinavica*, v. 11, no. 6, 1957, p. 945-949.

Synthesis by addition of H_2S trichloroacetic acid anhydride. Infra-red spectra of trichlorothiolacetic acid, trichloroacetic acid, and trichloroacetyl chloride.

1841 Alkoxides of Silicon Containing Silicon-Hydrogen Bonds. Wendell S. Miller, John S. Peake, and William H. Nebergall. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5604-5606.

Alkoxysilanes containing more than one H atom bonded to Si were prepared by two types of reaction. The first is a modified Williamson synthesis and the second a Cu-catalyzed reaction between Si-H bonds and alcohols.

1842 Ion Exchange Studies of Transguanylation Reactions. I. Rearrangement of S,2-Aminoethylisothiourea to 2-Mercaptoethylguanidine and 2-Aminothiazoline. Joseph X. Khym, Raymond Shapira, and David G. Doherty. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5663-5666.

Nature and amount of the reaction products are dependent on both *p*H and time. In strong acid, AET remains unchanged; at *p*H 2.5 it is converted to 2-A*t*, and at *p*H 7 the only product is MEG.

1843 Synthesis of Aminoalkylisothiuronium Salts and Their Conversion to Mercaptoalkylguanidines and Thiazolines. David G. Doherty, Raymond Shapira, and W. T. Burnett, Jr. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5667-5671.

1844 Physicochemical Properties of *p*-Carboxyphenylazoinsulins. Walter L. Koltun. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5681-5686.

1845 The Fischer Indole Synthesis. V. 2-Carbethoxy-4,7-Dimethylindole From Ethyl Pyruvate 2,6-Dimethylphenylhydrazone. Robert B. Carlin, William O. Henley, Jr., and D. Peter Carlson. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5712-5717.

1846 The Structure of Alantolactone. Kyosuke Tsuda, Katsumi Tanabe, Issei Iwai, and Kazuhisa Funakoshi. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5721-5724.

The position of the lactone ring was determined; the lactonic hydroxyl must be located at C_7.

1847 The Preparation of Some 6-Methylated Dihydrodesoxymorphines. Mohindra S. Chadha and Henry Rapoport. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5730-5734.

The action of triphenylphosphinemethylene on dihydrocodeinone gave an excellent yield of 6-methylenedihydrodesoxycodeine, and this was successfully hydrogenated to 6-methyldihydrodesoxycodeine. Both compounds were then cleaved with pyridine hydrochloride to the corresponding morphine derivatives.

1848 The Preparation and Properties of Oxaziranes. William D. Emmons. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5739-5754.

Preparation of a wide variety of oxaziranes by oxidation of the appropriate imine with peracetic acid. These compounds represent a previously unknown heterocycle, a C-N-O three-membered ring.

1849 Reactions of Hindered α-Substituted Acids. V. The Effect of a β-Methyl Group on the Acid-Catalyzed Rearrangement. Wyman R. Vaughan and A. Charles Schoenthaler. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5777-5780.

The role of the methyl group in promoting the acid-catalyzed rearrangement of 2-hydroxy-3-methyldibenzo[2.2.2]bicyclooctadiene-*trans*-2,3-dicarboxylic acid to 2-*exo*-hydroxy-6-methyl-3,4,7,8-dibenzo [3.2.1]bicyclooctadiene-1-*cis*-6-dicarboxylic acid 2,6-lactone is considered in the light of the failure of the dimethyl analog to undergo the rearrangement.

1850 Crystalline 4-*O*-Benzoyl-1,2:5,6-di-*O*-Isopropylidene-D-Arabo-3-Hexulose. A New Route to Talitol Derivatives. James M. Sugihara and George U. Yuen. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5780-5782.

Preparation by means of monobenzoylation of 1,2:5,6-di-*O*-isopropylidene-D-mannitol followed by oxidation with chromic acid-pyridine.

1851 Liquid Phase Catalytic Isomerization of α-Pinene. V. P. Wystrach, L. H. Barnum, and M. Garber. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5786-5790.

Alpha-pinene was isomerized at the reflux temperature in the presence of about 1% of calcined Attapulgus clay or cobalt molybdite-alumina catalyst. Camphene and dipentene were found to be primary products formed directly from α-pinene by relatively fast reactions.

1852 Telomerization of Ethylene With Methyl Bromoacetate. W. A. Skinner, J. D. Johnston, and Mary Fisher. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5790-5792.

Methyl ω-bromoesters were prepared in good yields. Effects of variations in ethylene pressure, reaction temperature, initiator, and solvent on the product distribution were studied.

1853 Reaction of α-Methylstyrene Catalyzed by Sodium. Marjan Kolobielski and Herman Pines. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5820-5825.

Products were composed of cumene, *p*-terphenyl, 1-methyl-1,3-diphenylcyclopentane, and a trimer.

1854 Appearance of FeC in a Hydrocarbon Synthesis Catalyst. J. D. Louw, J. P. Van Den Berg, L. C. Ferreira, and J. J. Pienaar. *American Chemical Society, Journal*, v. 79, Nov. 20, 1957, p. 5899-5902.

New crystalline phase, discovered in the catalyst during Fischer-Tropsch synthesis, was analyzed by wet chemical methods and evaluated by X-ray diffraction.

1855 The Displacement Reaction of Haloalkenes With Iodide Ion. A Survey of Reactivity and Mechanism. Sidney I. Miller and Peter K. Yonan. *American Chemical Society*, Journal, v. 79, Nov. 20, 1957, p. 5931-5937.

A proposed mechanism explaining reaction of iodide with *cis*- or *trans*-*p*-nitro-ω-bromostyrene in diethylene glycol mono-*n*-butyl ether, where the exchange rates are greater than the isomerization rates.

1856 The Acid-Catalyzed Dissociation of Bis-9-Anthraldehyde. Frederick D. Greene, Santiago Robledo Ocampo, and Louis A. Kaminski. *American Chemical Society, Journal*, v. 79, Nov. 20, 1957, p. 5957-5962.

This compound undergoes facile acid-catalyzed cleavage to 9-anthraldehyde in benzene solution. The cleavage reaction shows great sensitivity to the strength of the acid catalyst.

1857 A New Synthesis of Peracetic Acid. Benjamin Phillips, Frederick C. Frostick, Jr., and Paul S. Starcher. *American Chemical Society, Journal*, v. 79, Nov. 20, 1957, p. 5982-5986.

Acetaldehyde is autoxidized at low temperature to an intermediate peroxide, acetaldehyde monoperacetate, which is then pyrolyzed to peracetic acid and acetaldehyde which are separated rapidly in a fractionating column.

1858 The Dinitrogen Pentoxide-Olefin Reaction. Travis E. Stevens and William D. Emmons. *American Chemical Society, Journal*, v. 79, Nov. 20, 1957, p. 6008-6014.

Simple acyclic olefins gave 1,2-nitronitrates and a mixture of α- and β-nitroolefins. Cyclohexene gave a complex mixture that included 1,3- and 1,4-nitronitrates indicating that nitration by the nitronium ion may have occurred. *cis*-Addition of dinitrogen pentoxide occurred in the presence of excess nitrate ion.

1859 Organic Sulfur Compounds. XXXIV. Synthesis of Ethylenes and Ethylene Sulfides by Action of Diazoalkanes on Thioketones. Alexander Schönberg, Abd El Kader Fateen, and Abd El Maged Amine Sammour. *American Chemical Society, Journal*, v. 79, Nov. 20, 1957, p. 6020-6023.

Various ethylene sulfides, prepared by the interaction of diazoalkanes with xanthione and Michler thioketone, were allowed to react with copper bronze in boiling xylene, yielding the corresponding ethylene compounds.

1860 Bridged Polycyclic Compounds. III. Addition of p-Toluenesulfenyl Chloride to Norbornene, Norbornadiene, Aldrin and 9,10-Dihydro-9,10-Ethenoanthracene. Stanley J. Cristol, Robert P. Arganbright, Gordon D. Brindell, and Roger M. Heitz. **IV. The Stereochemistry of the Free Radical Addition of *p*-Thiocresol to a Bicyclo[2,2,1]Heptene and a Bicyclo[2,2,2]Octene.** Stanley J. Cristol and Robert P. Arganbright. *American Chemical Society, Journal*, v. 79, Nov. 20, 1957, p. 6039-6041.

1861* (German.) Cyclic Nitrones. **Cyclische Nitrone. II.** Polymers of 2,3,4,5-Tetrahydro-Pyridine-*N*-Oxide, and Related Compounds. **Über die Polymeren des 2.3.4.5-Tetrahydropyridin-*N*-oxyds und verwandte Verbindungen.** Jan. Thesing and Hans Mayer. *Annalen der Chemie*, v. 609, nos. 1-3, 1957, p. 46-57.

During dehydration of *N*-hydroxy-piperidine with $K_3Fe(CN)_6$, an oily trimer of the 2,3,4,5-tetrahydropyridin-*N*-oxide develops which, later, changes to a crystallized dimer and undefined higher-molecular polymers.

1862* (German.) Polycyclic Tropolones. **Über polycyclische Tropolone. IV.** "1,2-Naphth-Tropolone." **"1.2-Naphth-Tropolon."** Wilhelm Treibs and Günter Herdmann. *Annalen der Chemie*, v. 609, nos. 1-3, 1957, p. 70-74.

The 1,2-naphth-(α,β)-cycloheptenone-(3) was prepared from β-naphthaldehyde, and then reduced (in two ways) to the 1,2-naphth-(α,β)-cycloheptatrienolone-(3,4), the "1,2-naphthtropolone".

1863* (German.) Cyclic Peptides. **Cyclische Peptide. II.** The Synthesis of Cyclic Oligopeptides of ε-Amino-Caproic Acid. Constitutional Analysis of Cyclic Components of Polycaprolactam. **Synthese cyclischer Oligopeptide der ε-Aminocapronsäure. Konstitutionsaufklärung der ringförmigen Bestandteile von Polycaprolactam.** Manfred Rothe and Friedrich-Wilhelm Kunitz. *Annalen der Chemie*, v. 609, nos. 1-3, 1957, p. 88-102.

1864* (German.) Azo-Dyes Obtained Through Oxidation-Coupling. **Azofarbstoffe durch oxydative Kuppling. I.** Dyes From *N*-Methyl-Benzthiazole-Hydrazone. **Farbstoffe aus *N*-Methyl-benzthiazolon-hydrazon.** Siegfried Hünig and Karl Herbert Fritsch. **II.** Synthesis of Joinable Heterocyclic 2-Hydrazones. **Synthese kupplungsfähiger heterocyclischer 2-Hydrazone.** Siegfried Hünig and Heinz Balli. **III.** Tetra-Azapentamethincyanine and Dehydro-Formazane. **Tetra-azapentamethincyanine und Dehydro-formazane.** Siegfried Hünig and Karl Herbert Fritsch. *Annalen der Chemie*, v. 609, nos. 1-3, 1957, p. 143-180.

1865* A New Interpretation of the Acidic and Basic Structures in Carbons. I. Lactone Groups of the Ordinary and Fluorescent Types in Carbons. V. A. Garten, D. E. Weiss, and J. B. Willis. **II. The Chromene-Carbonium Ion Couple in Carbon.** V. A. Garten and D. E. Weiss. *Australian Journal of Chemistry*, v. 10, Aug. 1957, p. 295-328.

1866* Methylsteriods. III. Reduction of Ketones Derived From Lanosterol. C. S. Barnes and A. Palmer. *Australian Journal of Chemistry*, v. 10, Aug. 1957, p. 334-343.

The base catalyzed hydrogen transfer from solvent alcohol to carbonyl groups is studied with 7,11-dioxolanostan-3 β-yl acetate. Formation and stereochemistry are accounted for.

1867 Reduction of Halogenated Nitrobenzenes. Paul E. Gagnon, Karl F. Keirstead, and Brian T. Newbold. *Canadian Journal of Chemistry*, v. 35, Nov. 1957, p. 1304-1318.

Investigation of reduction with sodium arsenite, dextrose, lactose, maltose, NaOH and alcohols, and KOH and ethanol.

1868 Stereochemistry and Heterogeneous Catalysis. Robert L. Burwell, Jr. *Chemical Reviews*, v. 57, Oct. 1957, p. 895-934.

Hydrogenation of the acetylenic linkage, carbon-carbon double bonds, and aromatic rings; cis-trans isomerization; sterochemistry of isotopic exchange; mechanism of the interaction of H and hydrocarbons; applications of optical activity to heterogeneous catalysis.

1869 Cyclic Keto-Amines. II. The Preparation and Spectroscopic Characteristics of Substituted 1:2:3:4-Tetrahydro-4-Oxoquinolines. John T. Braunholtz and Frederick G. Mann. *Chemical Society, Journal*, 1957, Oct., p. 4166-4173.

1870 Seven-Membered Heterocyclic Systems. I. The Attempted Friedel-Crafts Cyclisation of γ-Arylsulphonamidobutyric Acids. John T. Braunholtz and Frederick G. Mann. *Chemical Society, Journal*, 1957, Oct., p. 4174-4182.

Unexpected, and in certain cases rather complex, reactions occur with the formation of derivatives of *N*-phenylpyrrolid-2-one.

1871 Reactions of Unsaturated Compounds. XIII. The Oxidation of 1:1-Diarylolefins by Chromic Oxide. W. J. Hickinbottom and G. E. M. Moussa. *Chemical Society, Journal*, 1957, Oct., p. 4195-4198.

Epoxide was the major product from all the olefins examined, but fission products were also obtained.

1872 The Reaction of Imidates With α-Amino-Acetals and α-Amino-Aldehydes. Alexander Lawson. *Chemical Society, Journal*, 1957, Oct., p. 4225-4228.

Reaction yields the corresponding 2:5-disubstituted glyoxalines.

1873 Free Radicals and Radical Stability. XIII. Triphenylmethyls Containing *m*-Methoxyl Substituents. S. T. Bowden. **XIV. (Ethoxyphenyl)Diphenylmethanols and the Free Radical (*o*-Ethoxyphenyl)-Diphenylmethyl.** S. T. Bowden and D. T. Zalichi. **XV. The Properties of (*o*-Hydroxyphenyl)Diphenylmethanol and (3-Hydroxy-2-Naphthyl)Diphenylmethanol. XVI. The Properties of Triarylmethanols Containing *p*-Hydroxyl Substituents, and the Quinonoidation Theory of Free Radicals. XVII. (*m*-Hydroxy-phenyl) Diphenylmethanol and the Corresponding Free Radical. XVIII. (Halogenophenyl)Diphenylmethyls and the Removal of Nuclear Halogen by Silver.** K. I. Beynon and S. T. Bowden. *Chemical Society, Journal*, 1957, Oct., p. 4235-4262.

1874 The Hydrolysis of Sodium Trithiocarbonate and Its Reaction With Ethanol. G. Ingram and B. A. Toms. *Chemical Society, Journal*, 1957, Oct., p. 4328-4344.

1875 Quantitative Aspects of Reductions of Carbohydrates by Potassium Borohydride. P. D. Bragg and L. Hough. *Chemical Society, Journal*, 1957, Oct., p. 4347-4352.

Estimations of the uptake of H from borohydride in borate buffer, by various monosaccharides and their derivatives, show that 3-*O*-substituted aldoses and 4-*O*-substituted hexuloses react slowly because of steric hindrance. Smaller but significant differences in reaction rates are attributed to the formation of borate complexes.

1876* (German.) A Correct Structure for Benzene. **Uber ein richtiges Modell des Benzols.** A. W. Kwiecinski. *Chemiker-Zeitung*, v. 81, Oct. 5, 1957, p. 643-645.

The combination of the aromatic essences is explained in that a C atom is not replaced by van t'Hoff's vector pattern, but by a corpuscular molecule, permitting a much more precise representation of the molecular structure.

1877* (German.) Formation of Four-Membered Rings by the Addition of Maleic Anhydride to Allene. **Über die Bildung von viergliedrigen Ringen bei der Addition von Maleinsäureanhydrid and Allene.** Kurt Alder and Otto Ackermann. *Chemische Berichte*, v. 90, no. 9, 1957, p. 1697-1709.

Investigation of the reactions of maleic anhydride with ethylallene, 1,1-dimethyl-allene, and 1,3-dimethyl-allene.

1878* (German.) Reductions With $LiAlH_4$. **Reduktionen mit $LiAlH_4$. X.** The Effect of Lithium Aluminum Hydride on Hydrocarbon Derivatives With Negative Substituents on Adjacent Carbon Atoms. **Über die Einwirkung von Lithiumaluminiumhydrid auf Kohlenwasserstoffderivate mit negativen Substituenten an benachbarten Kohlenstoffatomen. XI.** Hydrogenated Splitting of C-C Bonds. **Über eine hydrierende Spaltung von C-C-Bindungen.** Alfred Dornow and Klaus Jürgen Fust. *Chemische Berichte*, v. 90, no. 9, 1957, p. 1769-1780.

1879* (German.) Relationship Between Reactivity of Functional Groups of Paraffin-Hydrocarbons and Their Places in the Molecule. **Über die Abhängigkeit der Reaktionsfähigkeit funktioneller Gruppen in Paraffinkohlenwasserstoffen von ihrer Stellung in der Molekel. VII.** Relationship Between the Aminolysis Rate of n-Octadecylchloride Isomer and the Positions of Chlorine in the Molecule. **Über die Abhängigkeit der Aminolysegeschwindigkeit isomerer n-Octadecylchloride von der Stellung des Chlors in der Molekel. VIII.** Temperature Effect on the Formation of Primary Chlorides During the Direct Chlorination of n-Octadecane. **Über den Einfluss der Temperatur auf die Bildung primärer Chloride bei der direkten Chlorierung von n-Octadecan.** Gerhard Geiseler and Friedrich Asinger. **IX.** On the Composition of Products From the Direct Nitration of *n*-Octadecane. **Über die Zusammensetzung der Produkte der direkten Nitrierung von n-Octadecan.** Friedrich Asinger, Gerhard Geiseler, and Wolf-Dieter Wirth. *Chemische Berichte*, v. 90, no. 9, 1957, p. 1786 + 23 pages.

1880* (German.) Study of the Cyclobutane Series. **Untersuchungen in der Cyclobutanreihe. II.** Study of Cyclobutadiene. **Zur Kenntnis des Cyclobutadiens.** Margarete Avram, Costin D. Nenitzescu, and Elise Marica. *Chemische Berichte*, v. 90, no. 9, 1957, p. 1857-1868.

Hofmann degradation of 1,3-diamino-cyclobutane by means of diquaternary bases, and the thermal splitting of cyclotetra-adducts.

1881* (German.) N-Trifluoracetyl-Amino Acids. **N-Trifluoracetylaminosäuren. X.** N-Trifluoracetyl-L-Asparaginic Acid Anhydride and N-Trifluoracetyl-L-Proline Anhydride. **N-Trifluoracetyl-L-Asparaginsäure-anhydrid und N-Trifluoracetyl-L-prolin-anhydrid.** Friedrich Weygand, Peter Klinke, and Irene Eigen. *Chemische Berichte*, v. 90, no. 9, 1957, p. 1896-1905.

Preparation, properties, and derivatives.

1882* (German.) Central Rings. **Mittlere Ringe. IX.** Steric Mesomeric Hindrance in 1,2-Benzo-Cyclo-(1)-One-(3). **Weiteres zur sterischen Mesomeriehinderung in 1.2-Benzocyclen-(1)-onen-(3).** Rolf Huisgen, Ivar Ugi, Erich Rauenbusch, Volker Vossius, and Herald Oertel. **X.** Reactions of 1,2-Benzo-Cyclo-Octene-(1). **Reaktionen in der Reihe des 1.2-Benzocyclooctens-(1).** Rolf Huisgen, Erich Rauenbusch, and Günther Seidl. *Chemische Berichte*, v. 90, no. 9, 1957, p. 1946-1965.

1883* (German.) Reductions With $LiAlH_4$. **Reduktionen mit $LiAlH_4$. XII.** Another Hydrogenation Cleavage of C–C Bonds. **Über eine weitere hydrierende Spaltung von C—C-Bindungen.** Alfred Dornow, Klaus Jürgen Fust, and Heinz Dietrich Jordan. *Chemische Berichte*, v. 90, no. 10, 1957, p. 2124-2137.

Reduction of various substituted furoxanes.

1884* (German.) Pseudobases. **Über Pseudobasen. V.** Tests in the Acridinium Series. **Versuche in der Acridinium-Reihe.** Fritz Kröhnke and Hans Ludwig Honig. **VI.** *meta*-Substitutions in the Chinoline and Isochinoline Core of Pseudobase-Adducts. ***meta*-Substitutionen im Chinolin- und Isochinolinkern von Pseudobasen-Addukten.** Fritz Kröhnke and Isolde Vogt. *Chemische Berichte*, v. 90, no. 10, 1957, p. 2215-2236.

1885* (German.) The Solubility of Triphenyl-Thallium, -Gallium, -Indium, -Aluminum, and -Boron, as Well as Diphenyl-Mercury and Biphenyl in Organic Solvents. **Die Löslichkeiten von Triphenylthallium, -gallium, -indium, -aluminium und -bor sowie Diphenylquecksilber und Biphenyl in organischen Lösungsmitteln.** Walter Strohmeier and Karlheinz Hümpfner. *Chemische Berichte*, v. 90, no. 10, 1957, p. 2339-2341.

1886* (German.) The Influence of Metallorganic Compounds on Trifluorchlorethylene. **Die Einwirkung metallorganischer Verbindungen auf Trifluorchloräthylen.** Richard Meier and Franz Böhler. *Chemische Berichte*, v. 90, no. 10, 1957, p. 2344-2349.

Phenyllithium, reacting with trifluorchlorethylene at high temperature, yields difluorchlorstyrene.

1887* (German.) Reduction of the Methyl Ester of Benzoyldiazoacetic Acid. **Über die Reduktion des Benzoyl-diazoessigsäure-methylesters.** Robert Pfleger and Friedrich Reinhardt. *Chemische Berichte*, v. 90, no. 10, 1957, p. 2404-2411.

During the reduction with Al amalgam or Zn in glacial acetic acid, β-phenyl-hydracrylic acid-methylester develops. Catalytic hydration results in the formation of erythro-β-phenyl-serine-methylester.

1888* (Russian.) Association of Organo-Lithium Compounds of the Aliphatic Series in Hydrocarbon Solutions. **Ob assotsiatsii litiiorganicheskikh soedinenii zhirnogo riada v rastvorakh uglevodorodov.** K. B. Piotrovskii and M. P. Ronina. *Doklady Akademii Nauk SSSR*, v. 115, no. 4, Aug. 1, 1957, p. 737-739.

Several compounds were studied in order to find out their ability to form "autocomplexes", having the general formula $[LiR_2]^-Li^+$.

1889* (Russian.) Investigation of Nitration of Isopropylcyclohexane With Nitric Acid. **Issledovanie reaktsii nitrovaniia izopropiltsiklogeksana azotnoi kislotoi.** A. V. Topchiev, S. D. Mekhtiev, and A. Sh. Novruzova. *Doklady Akademii Nauk SSSR*, v. 115, no. 5, Aug. 11, 1957, p. 931-933.

Optimum reaction conditions were determined.

1890* (Italian.) Formation of Some Aromatic Sulfides. **Sulla formazione di alcuni solfuri aromatici.** Michele Giua and Rosa Bianco. *Gazzetta Chimica Italiana*, v. 87, no. 9, Sept. 1957, p. 1050-1056.

Halogen polynitro derivatives containing the halogen and a labile nitro group can produce bis-diarylsulfides. Thus chlorotrinitrobenzene and bromotrinitrobenzene give aryl thiophenol derivatives of dinitrothioresorcin. Ultraviolet absorption spectra of the mono- and bis-sulfides were obtained.

1891* (Italian.) Investigations of Ethylation. **Ricerche sulla etilenazione. X.** Stereospecific Synthesis of Cis- and Trans-1-2-Dichloro-2-Aryl-Mercapto-Ethylene. **Sintesi stereospecifica dei cis e trans 1-2-dicloro-2-aril-mercapto-etileni.** Fernando Montanari and Adriana Negrini. *Gazzetta Chimica Italiana*, v. 87, no. 10, Oct. 1957, p. 1061-1067.

Cis-III 1-2-dichloro-2-aryl-mercapto-ethylenes were obtained by nucleophilic trans-addition of the thiophenols to the dichloroacetylene in the presence of bases; the trans-VIII, by trans-addition of the sulfonyl chlorides to monochloro acetylene.

1892* (Italian.) Synthesis of Aryl-Mercapto-Acetylene. **La sintesi degli aril-mercapto-acetileni.** Enrico Angeletti, Fernando Montanari, and Adriana Negrini. *Gazzetta Chimica Italiana*, v. 87, no. 10, Oct. 1957, p. 1115-1124.

Synthesis of new acetylene derivatives by dehalogenating the cis-1-halogen-2-aryl-mercapto-ethylene-1 with alcoholic KOH at room temperature, or the trans 1-halogen-2-aryl-mercapto-ethylene-II with $NaNH_2$ in liquid NH_3.

1893* (Italian.) Reduction of Some Phthalic, Tetrahydrophthalic and Hexahydrophthalic Anhydrides With $LiAlH_4$. **Riduzione con $LiAlH_4$ di alcune anidridi ftaliche, tetraidroftaliche ed esaidroftaliche. I.** Valerio Parrini. *Gazzetta Chimica Italiana*, v. 87, no. 10, Oct. 1957, p. 1147-1162.

1894 Spontaneous Decomposition of Trichloroethylene. G. F. Yost. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-39945 (Suppl. 1), July 1957, 8 p. (UF767 Un3.1hw Contin.)

Trichloroethylene stabilized with either neutral or alkaline stabilizers can be used safely in degreasing operations, even when the system contains trace amounts of acid. A control limit of 200 p.p.m. maximum chloride concentration, and a minimum pH value of 4 was established.

1895* Selective Demethylation of the 5-Methoxyl Group in Flavanones and Synthesis of Dihydrowogonin. S. N. Aiyar, Ishwar Dass, and T. R. Seshadri. *Indian Academy of Sciences, Proceedings*, v. 46, sec. A, Sept. 1957, p. 238-244.

Anhydrous $AlCl_3$ in ether solution is a convenient reagent for the selective demethylation of the 5-position of methoxy flavanones. Several typical compounds are reported, the most important being naringenin dimethyl ether, citronetin monomethyl ether, and carthamidin and isocarthamidin trimethyl ethers.

1896* (Russian.) Effect of Nitric Acid on 1,1,5-Trichloropentene-1 and 1,1-Dichloropentene-1. **Deistvie azotnoi kisloty na 1.1.5-trikhlorpenten-1 i 1.1-dikhlorpenten-1.** L. I. Zakharkin. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1957, no. 9, Sept., p. 1064-1071.

Preparation of several compounds by the reaction.

1897* (Russian.) Organoboron Compounds. **Bororganicheskie soekineniia. XIX.** Synthesis of Alkylborondichlorides. **Sintez alkilbordikhloridov.** B. M. Mikhailov and T. A. Shchegoleva. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1957, no. 9, Sept., p. 1080-1085.

Prepared by the reaction of two equivalents of PCl_3 with N-hexyl ethers of alkyloboric acid.

1898* (Russian.) Redox Systems for Initiating Radical Processes. **Okislitel'no-vosstanovitelnye sistemy dlia initsiirovaniia radikal'nykh protsessov. VI.** Systems With Participation of Oxygen for Initiating of the Oxidizing Destruction of Polymers. **Sistemy s uchastiem kisloroda dlia initsiirovaniia protsessa okislitel'noi destruktsii polimerov.** E. I. Tiniakova, B. A. Dolgoplosk, and V. N. Reikh. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1957, no. 9, Sept., p. 1111-1121.

The activating mechanism of different oxidation reduction systems containing organic reducing agent, iron salts, and oxygen was studied. Shows a possibility of using such systems for initiation of destructive oxidation of unsaturated, and certain saturated polymers at low temperatures.

1899 Characterization of Organic Compounds With 2,4-Dinitrobenzenesulfenyl Chloride. Robert B. Langford and Daniel David Lawson. *Journal of Chemical Education*, v. 34, Oct. 1957, p. 510-512.

Preparation and properties of about 200 derivatives.

1900 Chloramine. Russell S. Drago. *Journal of Chemical Education*, v. 34, Nov. 1957, p. 541-545.

Synthesis, analytical detection, structure, physical properties, and chemical reactions.

1901 Infrared Absorption and Structure of Certain Derivatives of Cyclopropane. C. F. H. Allen, T. J. Davis, W. J. Humphlett, and D. W. Stewart. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1291-1295.

Infra-red absorptions of 20 derivatives of cyclopropane, mostly with carbonyl or other functional groups adjacent to the ring, were obtained.

1902 Heterogeneous Bimolecular Reduction. I. General Considerations of Mechanism. The Emmert Reaction. G. Bryant Bachman, M. Hamer, E. Dunning, and R. M. Schisla. **II. Direct Acylation of Pyridine and Its Homologs and Analogs.** G. Bryant Bachman and R. M. Schisla. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1296-1308.

1903 Reactivity of Organocadmium Reagents Toward Halides Other Than Acid Chlorides. Improvement of Conditions for the Reformatsky Reaction. James Cason and Ralph J. Fessenden. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1326-1332.

1904 Pinacollike Rearrangement of a Cyclopropane-1,2-Dimethylene Glycol. Robert A. Darby and Robert E. Lutz. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1353-1355.

The structure of *trans*-1,2-di(diphenylhydroxymethyl)cyclopropane was demonstrated by its properties and by oxidative degradation to β-benzoyl-β-phenylpropionic acid.

1905 Lead Tetraacetate Oxidations of 2,5-Diarylfurans. Chi-Kang Dien and Robert E. Lutz. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1355-1360.

Lead tetraacetate in chloroform solution oxidized five 2,5-diarylfurans to the *cis* unsaturated 1,4-diketones and converted three β-acetoxy-2,5-diarylfurans into the corresponding 2-acetoxy-3-furanones.

1906 Action of Metal Hydrides on β-(3-Indolyl)Ethyl-l-Pyridinium Salts. Robert C. Elderfield, Balthasar Fischer, and Jeanne M. Lagowski. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1376-1380.

The bromides are reduced with $LiAlH_4$ or $NaBH_4$ to give tetrahydropyridine derivatives. No cyclization to tetracyclic β-carbolines occurred. Stepwise reduction of 4-styrylquinoline was studied. An improved preparation of tryptophol is described.

1907 Concerning 2-Carbomethoxytropinone. Stephen P. Findlay. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1385-1394.

Racemic 2-carbomethoxytropinone is obtainable by the partial saponification of 2,4-dicarbomethoxytropinone and by the condensation of monomethyl β-ketoglutarate, obtained from β-ketoglutaric anhydride, with succindialdehyde and methylamine. 2-Carbomethoxytropinone can conceivably exist in three racemic and six optically active forms.

1908 Alicyclic Studies. XIII. Preparation and Reactions of 1,1'-Dicycloalkenyls. Dahlia Shimona Greidinger and David Ginsburg. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1406-1410.

Preparation of 1,1'-dicyclopentenyl, 1,1'-dicyclohexenyl, 1,1'-dicycloheptenyl, and 1,1'-dicyclooctenyl. Diels-Alder reactions.

1909 Reactions of Aromatic Sulfonyl Chlorides With Organocadmium Reagents. Henry R. Henze and Neil E. Artman. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1410-1413.

Aromatic sulfonyl chlorides react with diarylcadmium reagents to form simple or mixed aryl sulfones in fair yields; sulfinic acids and aryl halides are by-products. Aromatic sulfonyl chlorides react with dialkylcadmium reagents to yield alkyl chlorides and solid products.

1910 Decomposition of Allylanilines in the Presence of Zinc Chloride. Charles D. Hurd and William W. Jenkins. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1418-1423.

o-Allylaniline, *p*-propylaniline, hydrogen propylene, and tar were isolated after high temperature decomposition of *N*-allylaniline. Comparably, *N*-cinnamylaniline and $ZnCl_2$ gave rise to *o*-cinnamylaniline, *p*-cinnamylaniline, 2-phenylquinoline, hydrogen, and tar.

1911 Reactions of Hindered Phenols. I. Reactions of 4,4'-Dihydroxy-3,5,3',5',-Tetra-*tert*-Butyl Diphenylmethane. II. Base-Catalyzed Oxidations of Hindered Phenols. M. S. Kharasch and B. S. Joshi. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1435-1443.

1912 Influence of a 9(11)-Double Bond on the Course and Mechanism of Alkyl-Oxygen Cleavage Reactions of Unsaturated Steroids. William R. Nes and John A. Steele. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1457-1465.

1913 Ribofuranose Derivatives From 3,5-Di-*O*-Benzoyl-D-Ribosyl Chloride. I. 1,3,5-Tri-*O*-Benzoyl-β-D-Ribose and 5-*O*-Benzoyl-1,2,3,-O-Benzylidyne-α-D-Ribose. II. Further Reactions of 5-*O*-Benzoyl-1,2,3-*O*-Benzylidyne-α-D-Ribose. Robert K. Ness and Hewitt G. Fletcher, Jr. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1465-1473.

1914 Formation of Naphthalenes From Indenes. IV. The Effect of Substitution at the Ethylenic Double Bond. William E. Parham and Charles D. Wright. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1473-1477.

Addition of dihalocarbene to the indene double bond is inhibited by the groups chlorine, bromine, carbethoxy, or phenyl. When the substituent is electron-donating, such as methyl, isopropyl, or ethoxy, the yields of naphthalenes are comparable to those obtained with unsubstituted indene.

1915 Glycosidation With Trimethyl Orthoformate and Boron Trifluoride. M. L. Wolfrom, J. W. Spoors, and R. A. Gibbons. *Journal of Organic Chemistry*, v. 22, Nov. 1957, p. 1513-1514.

Methanolic trimethyl orthoformate in the presence of BF_3 constitutes a convenient system for glycoside synthesis in the sugar field.

1916* (English.) **Effect of Lower Fatty Acids on the Solubilization of Butanol-1 in Aqueous Solutions of Sodium Salts of Fatty Acids. I-II.** A. N. Bose and K. N. Mehrotra. *Journal für Praktische Chemie*, v. 5, nos. 1-2, Oct. 1957, p. 1-13.

1917* (German.) Study of the Oxidation of *n*-Alkanes to Fatty Acids at Low Temperatures (100 to 130 C) With Air. **Studien über die Oxydation von n-Alkanen bei niederen Temperaturen (100°-130°C) mit Luft zu vorwiegend Fettsäuren. III.** Characterization of Commercial Paraffins. Quantitative Determination of *n*-Alkane Content. **Zur Charakterisierung von technischen Paraffinen. Über die quantitative Bestimmung des n-Alkangehaltes. VI.** Reaction Enthalpy Measurement During Paraffin Oxidation. **Zur Messung der Reaktionsenthalpie bei der Paraffinoxydation.** E. Leibnitz, et al. *Journal für Praktische Chemie*, v. 5, nos. 1-2, Oct. 1957, p. 34-67.

1918* (German.) Chloranil Preparation From Phenol. **Zur Darstellung des Chloranils aus Phenol.** Heinz Müller and Helmut Linde. *Journal für Praktische Chemie*, v. 5, nos. 1-2, Oct. 1957, p. 77-82.

Describes the chlorination reaction mechanism in the aqueous-acid phase, based on analytical data and model studies.

1919* (German.) Cyanidation of Certain 2,4,5-Trichlorbenzylarylsulfide Derivatives of Sulfone. **Cyanäthylierung einiger von 2,4,5-Trichlorbenzylarylsulfiden abgeleiteter Sulfone.** Alfred Jumar and Wilfried Schulze. *Journal für Praktische Chemie*, v. 5, nos. 1-2, Oct. 1957, p. 83-90.

Preparation of sulfones by means of acrylonitrile; their insecticidal and acaricidal properties.

1920* (German.) Friedel-Crafts Syntheses With Amino-Acid Chlorides. ***Friedel-Crafts*sche Synthesen mit Aminosäurechloriden.** Helmut Zinner and Gottfried Brossmann. *Journal für Praktische Chemie*, v. 5, nos. 1-2, Oct. 1957, p. 91-96.

Preparation of aminoketone-hydrochlorides with benzene.

1921* Anthraquinone & Anthrone Series. XXI. 2-Bromomethylanthraquinones & Their Derivatives. M. D. Bhavsar, B. D. Tilak, and K. Venkataraman. *Journal of Scientific & Industrial Research*, v. 16, sec. B, Sept. 1957, p. 392-399.

Preparation and properties.

1922* Quinone Series. X. Benzo-*bis*-Naphthofuranquinones. R. V. Acharya, B. D. Tilak, and M. R. Venkiteswaran. *Journal of Scientific & Industrial Research*, v. 16, sec. B, Sept. 1957, p. 400-409.

Brazanquinone vat dyes were synthesized from 2:3-dichloro-1:4-naphthoquinone and naphthols. Condensation of chloranil with naphthols gave benzo-*bis*-naphthofuranquinones. The mechanism of these reactions was studied.

1923* (Russian.) Production of Acetonitrile From Paraffin Hydrocarbons and Ammonia in the Presence of Acid Catalysts. **Poluchenie atsetonitrila iz parafinovykh uglevodorodov i ammiaka v prisutstvii okisnykh katalizatorov.** Ia. M. Paushkin and L. V. Osipova. *Khimiia i Tekhnologiia Topliva, i Masel*, 1957, no. 11, Nov., p. 33-39.

Physical and chemical properties of hydrocarbons. Chemical constants of acetonitrile and formation from hydrocarbons and ammonia with Al-Mo catalysts, and from NH_3 and pentane-amylene mixtures.

1924 (Hungarian.) The Effect of Nitric Acid on Tyrosine. **Salétromossav hatása tirozinra.** Ferenc Péter and György Varsányi. *Magyar Kémiai Folyóirat*, v. 63, no. 9, Sept. 1957, p. 233-236.

Changes produced by nitric acid on tyrosine in HCl. Comparison between polarography and U. V. absorption spectrum of tyrosine treated with nitric acid and those of nitroso-, diazonium- and azo-compounds.

1925* (English.) **Chemistry of Acetylenic Ethers. XXVI. Ethyl Orthothioacetate and 1,1-Bis-Ethylthioethene (Ketene Diethyl Mercaptal).** H. C. Volger and J. F. Arens. *Recueil des Travaux Chimiques des Pays-Bas*, v. 76, nos. 9-10, Sept.-Oct. 1957, p. 847-859.

Preparation, properties, and reactions.

1926* (French.) α-Acetylene and δ-Ethylene Alcohols. **Sur les alcohols α-acétyléniques δ-éthyléniques.** Jean Colonge and Robert Falcotet. *Société Chimique de France, Bulletin*, 1957, no. 10, Oct., p. 1166-1169.

The cuprous derivatives of the true α-acetylene alcohols reacted with halogen derivatives of the allyl type. The unsaturated alcohols obtained could be decomposed into ethylene and acetylene hydrocarbides and into ketones.

1927* (French.) The Polyamine Complexes of Copper. **Les complexes polyaminés du cuivre. III.** Diethylenetriamine, Triethylenetetramine, Tetraethylenepentamine, and Dipropylenetriamine Copper Complexes. **Le cuivre diéthylènetriamine, triéthylènetétramine, tétraéthylènepentamine et dipropylènetriamine.** B. Kirson. *Société Chimique de France, Bulletin*, 1957, no. 10, Oct., p. 1178-1185.

A study of the relationship existing between the optical absorption of the aqueous solution of the complex and the number of the amino groups in the complex forming element, as well as the distance between amino groups.

1928* (Russian.) Investigations of the Theory of Nucleophilic Combinations. **Issledovaniia po teorii nukleofil'nykh prisoedinenii. VI.** Reaction of Hydrazoic Acid With Acetylene Dicarboxylic Acid Dimethyl Ether. **Prisoedinenie azotistovodorodnoi kisloty k dimetilovomu efiru atsetilendikarbonovoi kisloty.** V. G. Ostroverkhov and E. A. Shilov. *Ukrainskii Khimicheskii Zhurnal*, v. 23, no. 5, 1957, p. 615-622.

Kinetic dependencies and the reaction products were studied.

1929* (Russian.) Synthesis of Certain Fatty-Aromatic Chloralkylamines. **Sintez nekotorykh zhirno-aromaticheskikh khloralkilaminov.** L. B. Rapp and K. A. Kornev. *Ukrainskii Khimicheskii Zhurnal,* v. 23, no. 5, 1957, p. 637-641.

Synthesis of fatty-aromatic compounds having the following general formula: Ar-R-N(CH_2CH_2Cl)$_2$, where R=-CH_2-, -CH_2-CH_2-, or -CH_2-CH-CH_3; and Ar=C_6H_5-, CH_3-C_6H_{-4}, Cl-C_6H_4-, $C_2H_5OC_6H_4$-, (CH_3)$_3C_6H_2$-, $C_{10}H_7$-, $C_{10}H_{11}$-, or $C_{14}H_9$-.

1930* (Russian.) Organosilicon Alcohols and Phenols. **Kremneorganicheskie spirty i fenoly.** M. F. Shostakovskii, I. A. Shikhiev, and N. V. Komarov. *Uspekhi Khimii,* v. 26, no. 10, Oct. 1957, p. 1087-1108.

Systematization of literature concerning the chemistry of organosilicon alcohols appearing prior to 1957.

1931* (Russian.) Organometallic Unsaturated Compounds and Their Polymers. **Elementoorganicheskie nepredel'nye soedineniia i ikh polimery.** M. M. Koton. *Uspekhi Khimii,* v. 26, no. 10, Oct. 1957, p. 1125-1140.

Survey of literature listing results obtained in this field of high mol. wt. compounds.

1932* (Russian.) Reaction of the Full Ethers of Phosphorous and Phosphinous Acids With Conjugated Systems. **Prisoedinenie polnykh efirov fosforistoi i fosphinistykh kislot k sopriazhennym sistemam. I.** Reaction of Trialkylphosphites With Acrylic and Methacrylic Acids. **Prisoedinenie trialkilfosfitov k akrilovoi i metakrilovoi kislotam. II.** Reaction of Trialkylphosphites With Acrolein and Crotonaldehyde. **Prisoedinenie trialkilfosfitov k akroleinu i krotonovomu al'degidu.** Gil'm Kamai and V. A. Kukhtin. *Zhurnal Obshchei Khimii,* v. 27, no. 9, Sept. 1957, p. 2372-2380.

Preparation of the ethers of phosphonium carboxylic acids by the method of reaction of trialkyl phosphites with α,β-unsaturated acids. An explanation of the reaction mechanism of trialkylphosphites with α,β-unsaturated aldehydes and acids is suggested.

1933* (Russian.) Study of Conjugated Systems. **Issledovaniia v oblasti sopriazhennykh sistem. LXXXI.** The Order in Which Addition of Bromine to Dialkyl-Vinyl-Acetylenyl-Carbinol Occurs. **O poriadke prisoedineniia broma k dialkilvinilatsetilenil-karbinolam.** A. A. Petrov and K. B. Rall'. *Zhurnal Obshchei Khimii,* v. 27, no. 9, Sept. 1957, p. 2402-2406.

Bromination of dimethyl- and diisopropyl-vinylacetylenyl-carbinols, and its dominant products (acetylene bromides).

1934* (Russian.) Studying the Synthesis of Organo-Silicon Compounds. **Issledovanie v oblasti sinteza kremniiorganicheskikh soedinenii. II.** Relative Activity of the Different Types of Contact Surfaces Used in Synthesis of Methylchlorosilanes. **Sravnitel'naia aktivnost' razlichnykh tipov kontaktnykh mass, primeniaemykh dlia sinteza metilkhlorsilanov.** V. S. Fikhtengol'ts and A. L. Klebanskii. *Zhurnal Obshchei Khimii,* v. 27, no. 9, Sept. 1957, p. 2475-2479.

Relative activity of a Si alloy in combination with powdered or chemically deposited Cu. Relation between composition of beds and composition of the reaction products.

1935* (Russian.) Reaction of Certain γ-Chloralkylsilanechlorides With Silicon in Direct Synthesis. **O reaktsii nekotorykh γ-khloralkilsilankhloridov s kremniem v usloviiakh priamogo sinteza.** A. D. Petrov, S. I. Sadykh-Zade, V. A. Ponomarenko, B. A. Sokolov, and Iu. P. Egorov. *Zhurnal Obshchei Khimii,* v. 27, no. 9, Sept. 1957, p. 2479-2486.

Study of the reaction of γ-chloralkylalkyl dichlorosilane with Si, main feature of which is dehydrochlorination of the original γ-chlorides to pertinent unsaturated compounds.

1936* (Russian.) Investigation of the Synthesis and Transformations of Oxygen-Containing Organosilicon Compounds. **Issledovaniia v oblasti sinteza i prevrashchenii kislorodsoderzhashchikh kremniiorganicheskikh soedinenii. VI.** Reaction of Hydrogen-Containing Alkyl (Aryl) Dichlorosilanes With Organic Alcohols. **Vzaimodeistvie vodorodsoderzhashchikh alkil(aril)dikhlorsilanov s organicheskimi spirtami.** M. F. Shostakovskii, D. A. Kochkin, V. L. Vinogradov, and V. A. Neterman. *Zhurnal Obshchei Khimii,* v. 27, no. 9, Sept. 1957, p. 2487-2491.

Study of the reactions in which the ratios of alkylhalogensilane to alcohol were 1:1, 1:2, and 1:3. Several new compounds were prepared.

1937* (Russian.) N-Tiasolyl and N-Piridinyl Derivatives of Carbamide-N'-Phosphorous Acid. **N-Tiazolil- i N-piridilproizvodnye karbamid-N'-fosfornoi kisloty.** A. V. Kirsanov and E. S. Levchenko. *Zhurnal Obshchei Khimii,* v. 27, no. 9, Sept. 1957, p. 2585-2590.

Studies of the reaction of chloranhydride of isocyanide-phosphorous acid, and of methyl and diphenyl ethers of the acid with heterocyclic amines.

See also: **1774** (organic acids); **2156** (electrolytic reduction of 2-amino-4-chloropyrimidine and homologs); **2597** (waxes for foundry patterns).

CHEMISTRY—PHYSICAL

1938* (English.) **The Crystal Structure of $N_4S_4H_4$.** E. Wang Lund and Sven R. Svendsen. *Acta Chemica Scandinavica,* v. 11, no. 6, 1957, p. 940-944.

X-ray crystallographic study shows that the molecule has the form of a puckered eight-membered ring with alternating S and N atoms.

1939* (English.) **The Influence of Water Content on the Action of Ionizing Radiation on Starch.** L. Ehrenberg, M. Jaarma, and E. C. Zimmer. *Acta Chemica Scandinavica,* v. 11, no. 6, 1957, p. 950-956.

The number of breaks produced in the polysaccharide chains of the molecules per energy absorbed decreases with increasing water content.

1940* (English.) **Absorption Spectra of Dysprosium(III), Holmium(III), and Erbium(III) Aquo Ions.** Klixbüll Jørgensen. *Acta Chemica Scandinavica,* v. 11, no. 6, 1957, p. 981-989.

1941* (English.) **A New Interferometric Method for the Determination of Diffusion Coefficients of Very Dilute Solutions.** Olof Bryngdahl. *Acta Chemica Scandinavica,* v. 11, no. 6, 1957, p. 1017-1033.

Method utilizes birefringence interferences, is particularly valuable in the study of cases where the refractive index gradient has a low value.

1942* (English.) **Equilibrium Studies of Polyanions. II. Polyborates in $NaClO_4$ Medium.** Nils Ingri, Gösta Lagerström, Mina Frydman, and Lars Gunnar Sillen. *Acta Chemica Scandinavica,* v. 11, no. 6, 1957, p. 1034-1058.

The pH equilibria of boric acid and borate ion were studied in 3 M sodium perchlorate medium at 25 C by electrometric titration using a hydrogen electrode.

1943 The Radiation Chemistry of Water Vapor. The Indirect Effect on Deuterium and the Exchange of D-Atoms With Water Molecules. Richard F. Firestone. *American Chemical Society, Journal,* v. 79, Nov. 5, 1957, p. 5593-5598.

1944 Ion-Deficient Phases in Titanium and Vanadium Compounds of the Perovskite Type. Michael Kestigian, John G. Dickinson, and Roland Ward. *American Chemical Society, Journal,* v. 79, Nov. 5, 1957, p. 5598-5601.

Cation deficiency, represented by $M_{1-x}BO_3$, was observed in $LaVO_3$. Anion deficiency, represented by $MBO_{(3-x)}$, was investigated in Sr-Ti, La-Ti, La-Zr, La-V, and Sr-V oxides.

1945 The Estimation of Bisulfate Ion Dissociation in Sulfuric Acid-Sodium Sulfate Solutions. C. F. Baes, Jr. *American Chemical Society, Journal,* v. 79, Nov. 5, 1957, p. 5611-5616.

1946 High Temperature Heat Contents of Cryolite, Anhydrous Aluminum Fluoride and Sodium Fluoride. C. J. O'Brien and K. K. Kelley. *American Chemical Society, Journal,* v. 79, Nov. 5, 1957, p. 5616-5618.

1947 The Heat Capacity, Heat of Fusion, Heat of Transition and Heat of Vaporization of Chlorodifluoromethane Between 16°K and the Boiling Point. Eleanor F. Neilson and David White. *American Chemical Society, Journal,* v. 79, Nov. 5, 1957, p. 5618-5621.

1948 Solvolysis of Alkyl Borates. Catalysis by Amines and Phenols. Clinton L. Denson and Thomas I. Crowell. *American Chemical Society, Journal,* v. 79, Nov. 5, 1957, p. 5656-5658.

The ethanolysis of *sec*-butyl borate. The catalytic constants of the amines obey the Brönsted catalysis law except for negative deviations ascribed to steric effects.

1949 Ionization and Dissociation of Allene, Propyne, 1-Butyne, and 1,2- and 1,3-Butadienes by Electron Impact; the $C_3H_3^+$ Ion. J. Collin and F. P. Lossing. *American Chemical Society, Journal,* v. 79, Nov. 20, 1957, p. 5848-5853.

1950 Manganese-54, Uranium-233 and Cobalt-60 Complexes of Some Organic Acids. Norman C. Li, William M. Westfall, Arthur Lindenbaum, James M. White, and Jack Schubert. *American Chemical Society, Journal,* v. 79, Nov. 20, 1957, p. 5864-5870.

Formation constants of manganous complexes of 20 organic acids were determined using Mn-54 and an ion-exchange technique. Ion-exchange and solvent-extraction methods were used to study uranyl complexes of bioxalate, glycolate, and serine, and Co-60 complexes of four organic acids.

1951 Solvents Having High Dielectric Constants. VIII. The Conductimetric Behavior of Several Salts in Formamide at 25°. Lyle R. Dawson, Eugene D. Wilhoit, and Paul G. Sears. *American Chemical Society, Journal,* v. 79, Nov. 20, 1957, p. 5906-5908.

1952 Etherates of Lithium Borohydride. I. The System Lithium Borohydride-Dimethyl Ether. George W. Schaeffer, Thaddeus L. Kolski, and Donald L. Ekstedt. *American Chemical Society, Journal,* v. 79, Nov. 20, 1957, p. 5912-5915.

Pressure-composition isotherms at various temperatures. Heats and free energies of formation and absolute entropies of the etherates at 25 C.

1953 The Disproportionation and Combination Reactions of Butyl Free Radicals. John W. Kraus and Jack G. Calvert. *American Chemical Society, Journal,* v. 79, Nov. 20, 1957, p. 5921-5926.

Vapor phase photolyses of di-*t*-butyl, di-*iso*-butyl, and di-*sec*-butyl ketones. Rates of formation of the products, determined in experiments at several temperatures, light intensities, and ketone concentrations. Product analyses by mass spectrometry and vapor partition chromatography.

1954 Correlation of Solvolysis Rates. IV. Solvent Effects on Enthalpy and Entropy of Activation for Solvolysis of *t*-Butyl Chloride. S. Winstein and Arnold H. Fainberg. *American Chemical Society, Journal,* v. 79, Nov. 20, 1957, p. 5937-5950.

1955 Kinetics of the Isomerization of Substituted 5-Amino-1,2,3-Triazoles. Eugene Lieber, C. N. Ramachandra Rao, and Tai Siang Chao. *American Chemical Society, Journal,* v. 79, Nov. 20, 1957, p. 5962-5967.

Kinetics of the equilibrium where the 1-substituent is 4-NO_2-C_6H_4, 3-ClC_6H_4, C_6H_5, 4-$CH_3C_6H_4$, 4-$CH_3OC_6H_4$, and C_6H_5 CH_2 were studied in the range 133 to 159 C.

1956 Conformational Analysis. II. Esterification Rates of Cyclohexanols. Ernest L. Eliel and Carl A. Lukach. **III. Epimerization Equilibria of Alkylcyclohexanols. IV. Bimolecular Displacement Rates of Cyclohexyl *p*-Toluenesulfonates and the Conformational Equilibrium Constant of the *p*-Toluenesulfonate Group.** Ernest L. Eliel and Rolland S. Ro. *American Chemical Society, Journal,* v. 79, Nov. 20, 1957, p. 5986-6000.

1957 Some Reactivity Ratios of Esters of Acrylic Acid. C. S. Marvel and Roland Schwen. *American Chemical Society, Journal,* v. 79, Nov. 20, 1957, p. 6003-6005.

Reactivity ratios for hydronopyl acrylate with styrene, vinyl chloride, and acrylonitrile and for abityl acrylate with vinyl chloride were determined.

1958 The Kinetics of the Oxidation of a Mercaptan to the Corresponding Disulfide by Aqueous Hydrogen Peroxide. Ivan Pascal and D. Stanley Tarbell. *American Chemical Society, Journal,* v. 79, Nov. 20, 1957, p. 6015-6020.

1959* (French.) A Contribution to the Theoretical Study of Molecular Magnetic Susceptibilities. **Contribution a l'étude théorique des susceptibilités magnétiques moléculaires.** J. Tillieu. *Annales de Physique,* v. 2, ser. 13, nos. 7-8, July-Aug. 1957, p. 471-497.

Energy of a molecule disturbed by a magnetic field. General formulas of Van Vleck and magnetic susceptibility of H_2, D_2, DH, and CH_4. Calculations by a variation method.

1960 (French.) Millimeter Wave Study of the Rotation Spectrum of Formic Acid. **Sur l'étude aux ondes millimétriques du spectre de rotation de l'acide formique.** Raymond Wertheimer. *Annales des Telecommunications,* v. 12, July-Aug. 1957, p. 253-277.

Description of a spectrometer for the study of gas and vapor at low pressure. Measurement of the frequencies of 28 lines. Molecular constants of the acid.

1961* (Russian.) Determination of Composition and Instability Constants of the Complex Oxalate Ions of Pu^{+3}. **Opredelenie sostava i konstant nestoikosti oksalatnykh kompleksnykh ionov Pu^{+3}.** A. D. Gel'man, N. N. Matorina, and A. I. Moskvin. *Atomnaia Energiia,* v. 3, no. 10, Oct. 1957, p. 308-313.

Determining the solubility of $Pu_2(C_2O_4)_3 \cdot 9H_2O$ in aqueous $K_2C_2O_4$ solutions having different concentrations (0.01-2.4 mole/1) at constant temperature (20 C), and the ionic strength of the solutions. The formation of the following complex ions was established: $[Pu(C_2O_4)_2]^{-1}$, $[Pu(C_2O_4)_3]^{-3}$, and $[Pu(C_2O_4)_4]^{-5}$.

1962* (Russian.) Studying the Conditions of Formation and Stability of Complex Pu^{+3} Combinations by the Spectrophotometric Method. **Issledovanie uslovii obrazovaniia i ustoichivosti kompleksnykh soedinenii Pu^{+3} spektrofotometricheskim metodom.** A. D. Gel'man and A. I. Moskvin. *Atomnaia Energiia,* v. 3, no. 10, Oct. 1957, p. 314-316.

Formations of complexes of Pu^{+3} with $C_2O_4^{-2}$, CO_3^{-2}, $C_6H_5O_7^{-3}$ ions, and with trilone B.

1963* The Molar Kerr Constants, Dipole Moments, and Relaxation Times of Methyl and Ethyl Maleates and Fumarates, Ethyl Formate, Diethyl Oxalate, and of Ethyl and Propyl Azodiformates. Catherine G. Le Fèvre, R. J. W. Le Fèvre, and W. T. Oh. *Australian Journal of Chemistry,* v. 10, Aug. 1957, p. 218-226.

1964* Spectra of Sulphonyl Derivatives. III. Interaction With Attached Groups. IV. Sulphonic Esters. D. E. Freeman and A. N. Hambly. *Australian Journal of Chemistry,* v. 10, Aug. 1957, p. 227-249.

1965* Thermodynamic Data From Gas-Liquid Partition Chromatography. J. R. Anderson and K. H. Napier. *Australian Journal of Chemistry,* v. 10, Aug. 1957, p. 250-255.

Partition coefficients obtained from gas-liquid partition chromotography were compared with those obtained in a static system to show that the former are true equilibrium values. The heats and entropies of solution were obtained.

1966* The Kinetics of the Acid Hydrolysis of Some Dipeptides in Acetic Acid. R. J. L. Martin. *Australian Journal of Chemistry,* v. 10, Aug. 1957, p. 268-276.

Glycylglycine and a number of its *C*-methyl derivatives were hydrolyzed with excess perchloric acid in aqueous acetic acid as solvent, and by varying the water content of the medium, its effect on the reaction rate was determined.

1967* (German.) Thermoplasticity and Structure Viscosity in Bitumens and Similar Thermoplastics. **Thermoplastizität und Strukturviskosität bei Bitumen und ähnlichen Thermoplasten.** Felix Hempel. *Bitumen, Teere, Asphalte, Peche,* v. 8, Sept. 1957, p. 311-316.

Ratio of viscosity and temperature of bitumens and thermoplastics subjected to a steady flow. Rheological behavior during steady flow and constant decline of velocity.

1968 Dielectric Constants of Liquid Sulphur Dioxide, Ethyl Chloride, and Ethylene Oxide. J. D. Nickerson and R. McIntosh. *Canadian Journal of Chemistry*, v. 35, Nov. 1957, p. 1325-1331.

1969 Nuclear Magnetic Resonance Measurements in Solutions of Acetylacetone. The Effect of Solvent Interactions on the Tautomeric Equilibrium. L. W. Reeves. *Canadian Journal of Chemistry*, v. 35, Nov. 1957, p. 1351-1365.

1970* (English.) **Anion Exchange Adsorption of Some Metals From Mixed Solvents.** Yukichi Yoshino and Yoshimi Kurimura. *Chemical Society of Japan, Bulletin*, v. 30, no. 6, Sept. 1957, p. 563-566.

Anion exchange adsorption data for zinc(II) and copper(II) from organic solvent-HCl mixtures; effect of addition of organic solvents.

1971* (English.) **Relation Between Foaming Properties and the Structure of Surface Active Substances. I. Foaming Properties of Aqueous Soap and Sodium Dodecyl Sulfate.** Maresuke Kashiwagi. *Chemical Society of Japan, Bulletin*, v. 30, no. 6, Sept. 1957, p. 572-574.

1972* (English.) **Organic Semiconductors With High Conductivity. II. Structural Aspect of Violanthrene-Iodine Complex.** Hideo Akamatu, Yoshio Matsunaga, and Haruo Kuroda. *Chemical Society of Japan, Bulletin*, v. 30, no. 6, Sept. 1957, p. 618-625.

1973 Ionophoresis of Carbohydrates. VI. A Steric Effect in the Reaction of Certain Pyran Derivatives With Borate Ions. A. B. Foster. *Chemical Society, Journal*, 1957, Oct., p. 4214-4218.

The reaction of vicinal *cis*-hydroxyl groups in certain pyran derivatives, with borate ions, is hindered by a methoxyl group in vicinal *cis*-relationship. An explanation of this and related effects is suggested.

1974 Esterification by Sulphuric Acid. II. Ethyl Alcohol. D. J. Clark and Gwyn Williams. *Chemical Society, Journal*, 1957, Oct., p. 4218-4221.

Velocity and equilibrium constants are reported for the solvolytic esterification of ethyl alcohol in 60-82 wt.% aqueous H_2SO_4 at 25 C and in 70-93 wt.% aqueous H_2SO_4 at zero C.

1975 The Vapour Pressures of Nitric Acid Solutions. II. The Behaviour of Solutes in Nitric Acid. L. Lloyd and P. A. H. Wyatt. *Chemical Society, Journal*, 1957, Oct., p. 4268-4274.

1976 Crystal Symmetry and the Adsorption of Dyes by Growing Crystals. II. Potassium Nitrate. III. Sodium Nitrate and Ammonium Sulphate. John Whetstone. *Chemical Society, Journal*, 1957, Oct., p. 4284-4294.

1977 Infrared Spectra and Polar Effects. VII. Dipolar Effects in α-Halogenated Carbonyl Compounds. L. J. Bellamy and R. L. Williams. *Chemical Society, Journal*, 1957, Oct., p. 4294-4304.

The carbonyl frequencies of α-halogenated ketones, esters, and amides are discussed in relation to their steric arrangements. A number of otherwise anomalous frequencies can be explained on the basis of intramolecular dipolar effects.

1978 Researches on Monolayers. VI. A Study of Reactions in Surface Films of Acetates and Ketones, and Their Relation to Adsorption by Cellulose Acetate. A. Cameron, C. H. Giles, and T. H. MacEwan. *Chemical Society, Journal*, 1957, Oct., p. 4304-4311.

Monolayers of cetyl acetate, cellulose triacetate, methyl stearyl ketone, and ethyl stearyl ketone were studied.

1979 Solutions of Alcohols in Non-Polar Solvents. IV. Some Thermodynamic Properties of Glycols in Benzene, Heptane, and *cyclo*-Hexane. L. A. K. Staveley and G. L. Milward. *Chemical Society, Journal*, 1957, Oct., p. 4369-4375.

1980* (Russian.) Investigation of Isotactic Polypropylene by Means of Infra-Red Spectra. **Issledovanie izotakticheskogo polipropilena metodom infrakrasnykh spektrov.** E. I. Pokrovskii and M. V. Vol'kenshtein. *Doklady Akademii Nauk SSSR*, v. 115, no. 3, July 21, 1957, p. 552-553.

1981* (Russian.) Kinetics of Hydrogen Peroxide Decomposition Under γ-Radiation. **Kinetika razlozheniia perekisi vodoroda pod deistviem gamma-izlucheniia.** V. Ia. Chernykh, S. Ia. Pshezhetskii, and G. S. Tiurikov. *Doklady Akademii Nauk SSSR*, v. 115, no. 3, July 21, 1957, p. 560-563.

Study of decomposition under γ-rays and ultra-violet rays in the range of 2 to 92 mol.% H_2O; thermal and photoreaction laws.

1982* (Russian.) Interaction Between the Intramolecular and Lattice Vibrations in Crystals With Reference to Infra-Red Spectra. **Vzaimodeistvie vnutrimolekuliarnykh i reshetochnykh kolebanii kristallov po dannym infrakrasnykh spektrov.** E. F. Gross and A. A. Shultin. *Doklady Akademii Nauk SSSR*, v. 115, no. 4, Aug. 1, 1957, p. 689-692.

Infra-red absorption spectra of monocrystalline $Ba(NO_3)_2$ and $Pb(NO_3)_2$ were studied.

1983* (Russian.) The Kinetics of Catalytic Dehydrogenation of Isopropyl Alcohol in the Presence of Fourth-Period Transition Metals. **Kinetika kataliticheskoi degidrogenizatsii izopropilovogo spirta v prisutstvii perekhodnykh metallov IV perioda.** A. A. Balandin and P. Teteni. *Doklady Akademii Nauk SSSR*, v. 115, no. 4, Aug. 1, 1957, p. 727-730.

Dehydrogenation kinetics were studied using metallic Fe, Co, and Ni as catalysts.

1984* (Russian.) Polarization of Fluorescence in Solutions. **K teorii poliarizatsii fluorestsentsii rastvorov.** P. I. Kudriashov and B. Ia. Sveshnikov. *Doklady Akademii Nauk SSSR*, v. 115, no. 5, Aug. 11, 1957, p. 894-897.

Experimental study of polarization, yield and duration of fluoroscence in fluorescein solution, faded with KI.

1985* (Russian.) Kinetics of Shear Strain Development in Water Solutions of Glycerol, Sucrose and Xylitol. **Issledovanie kinetiki razvitiia deformatsii sdviga v vodnykh rastvorakh glitserina, sakharozy i ksilita.** L. V. Khailenko. *Doklady Akademii Nauk SSSR*, v. 115, no. 6, Aug. 21, 1957, p. 1135-1137.

Study of rheological properties in a wide range of concentrations.

1986 The Heats of Formation of Metal Hilides. Zirconium Tetrachloride. P. Gross, C. Hayman, and D. L. Levi. *Faraday Society, Transactions*, v. 53, Oct. 1957, p. 1285-1288.

Standard heat of formation is −234.7 kcal/mole by the reaction, $Zr + 2\ Cl_2 = ZrCl_4$.

1987 The Thermodynamics of Cation-Exchange. I. Determination of the Heats and Free Energies of Exchange by Resins. II. Comparison Between Resins and Concentrated Chloride Solutions. E. H. Cruickshank and P. Meares. *Faraday Society, Transactions*, v. 53, Oct. 1957, p. 1289-1308.

1988 The Dedeuteration of Alkyl-Substituted Benzenes in Acid Solution. E. L. Mackor, P. J. Smit, and J. H. Van der Waals. *Faraday Society, Transactions*, v. 53, Oct. 1957, p. 1309-1316.

The rate of dedeuteration of deuterated benzene and a number of its alkyl-substituted derivatives was measured in a homogeneous system, using $CF_3COOH + H_2SO_4$ mixtures as solvent.

1989 Some Effects of Self-Heating on Dilatometric Measurements in Polymerization and Other Chain Reactions. W. I. Bengough. *Faraday Society, Transactions*, v. 53, Oct. 1957, p. 1346-1354.

Non-isothermal conditions shown to occur during the first 10 to 20 min. of the reaction for polymerization reactions carried out dilatometrically in thermostatically controlled water baths. The effect of temperature on the shape of the contraction-time curve is discussed.

1990 The Adsorption of Hydrocarbon Vapours by Ammonium Phosphomolybdate. S. J. Gregg and R. Stock. *Faraday Society, Transactions*, v. 53, Oct. 1957, p. 1355-1362.

1991* (Italian.) Electronic Transmission Through Condensed Ring Systems. **Trasmissione elettronica attraverso sistemi ad anelli condensati. I.** The Dissociation Constants of Some 6-Substituted 1-Aza-4-Chloronaphthalenes. The *p* Reaction Constant. **Le constanti di dissociazione di alcuni 1-aza-4-cloronaftaleni-6-sostituiti. La constante di reazione *p*. En-**

rico Baciocchi and Gabriello Illuminati. *Gazzetta Chimica Italiana,* v. 87, no. 9, Sept. 1957, p. 981-991.

Determination of the apparent and thermodynamic dissociation constants at 25 C of a series of 6-substituted 4-chloroquinolines, by the spectrophotometric method in a dilute water-alcohol solvent.

1992* (Italian.) Self-Consistent Molecular Field and Ineffective Bonds. **Campo molecolare self-consistent e legami ineffettivi.** Elio Sparatore. *Gazzetta Chimica Italiana,* v. 87, no. 9, Sept. 1957, p. 1025-1037.

In the case of alternating hydrocarbons the orbit coefficients obtained were equal to those of the self consistent field. The energy of resonance of the self consistent field was half of that obtained by classical methods.

1993* (Italian.) Cobalt Dipyridyl and Phenanthroline Complexes. Redox Reaction. **Complessi cobaltici dipiridilici e fenantrolinici: ossiriduzioni relative.** Ernestina Paglia and Cenzo Sironi. *Gazzetta Chimica Italiana,* v. 87, no. 10, Oct. 1957, p. 1125-1132.

A study of the reciprocal stability of Co complexes of α,α'-dipyridyl and O,O'-phenanthroline, with determination of the redox potentials.

1994 Sources of Quantitative Physical and Chemical Data. II. B. C. Vickery. *Industrial Chemist,* v. 33, Oct. 1957, p. 491-493.

Considers specialized compilations recording particular physical properties.

1995 Ternary Vapour-Liquid Equilibria System: Acetone-Ethyl Methyl Ketone-*Cyclo*hexane. K. V. Kurmanadha Rao, V. V. G. Krishnamurty, and C. Venkata Rao. *Journal of Applied Chemistry,* v. 7, Oct. 1957, p. 535-543.

1996 Hydrogen Bonding in High Polymers and Inclusion Compounds. Maurice L. Huggins. *Journal of Chemical Education,* v. 34, Oct. 1957, p. 480-488.

Illustrates the importance of H-bonding in determining or modifying the structures of chemical substances and biological systems and in affecting properties which depend on these structures.

1997 Higher Order Rotation-Vibration Energies of Polyatomic Molecules. II-III. Gilbert Amat, Mark Goldsmith, and Harald H. Nielsen. *Journal of Chemical Physics,* v. 27, Oct. 1957, p. 838-850.

1998 Single-Pulse Shock Tube Studies of the Kinetics of the Reaction $N_2 + O_2 \rightleftarrows 2NO$ Between 2000-3000° K. H. S. Glick, J. J. Klein, and W. Squire. *Journal of Chemical Physics,* v. 27, Oct. 1957, p. 850-857.

1999 Photolysis of Water Vapor. Mei Chio Chen and H. Austin Taylor. *Journal of Chemical Physics,* v. 27, Oct. 1957, p. 857-863.

Reaction was studied in a flow system at rates up to 5 mole hr^{-1} at temperatures up to 540 K under the influence of H discharge radiation around 1650 A. The products H_2, O_2, and H_2O_2 varied in amounts and proportions depending on the geometry of the system.

2000 Some Photoelectric Properties of Chlorophyll. R. C. Nelson. *Journal of Chemical Physics,* v. 27, Oct. 1957, p. 864-867.

Both chlorophyll *a* and methyl chlorophyllide *a* have been found to be photoconductive in films deposited from solvents. Both pigments sensitize photoconductivity in CdS films, and the contact potential difference at the interface is of the correct sign to permit electron transfer from dye to crystal.

2001 Microwave Spectra of Molecules Exhibiting Internal Rotation. I. Propylene. II. Methylallene. David R. Lide, Jr. and D. E. Mann. *Journal of Chemical Physics,* v. 27, Oct. 1957, p. 868-877.

2002 Density of Liquid Ozone. Robert I. Brabets and John M. McDonough. *Journal of Chemical Physics,* v. 27, Oct. 1957, p. 880-882.

A density of 1.354 ± 0.001 g. per ml. is reported for liquid ozone at its normal boiling point 161 K.

2003 Infrared and Raman Spectra of Fluorinated Ethanes. IX. 1,1,1-Trifluoro-2-Chloro-2-Bromoethane. X. 1,1,1-Trifluoro-2-Bromethane. J. Rud Nielsen and Rose Theimer. *Journal of Chemical Physics,* v. 27, Oct. 1957, p. 887-895.

2004 Magnetic Susceptibilities of Some Pu^{+4} Compounds. W. Burton Lewis and Norman Elliott. *Journal of Chemical Physics,* v. 27, Oct. 1957, p. 904-908.

Magnetic susceptibilities of $Pu(SO_4)_2 \cdot 4H_2O$, $Rb_4Pu(SO_4)_4 \cdot 2H_2O$, $Pu(C_2O_4)_2 \cdot 6H_2O$, $[(CH_3)_4N]_2$-$PuCl_6$, and PuF_4 were measured over the temperature range 77-334 K. Large departures from the Curie-Weiss law are discussed.

2005 Dielectric Dispersion of Boric Acid in Water. The Rate of Recombination of H^+ and $H_2BO_3^-$ at 35° C. W. R. Gilkerson. *Journal of Chemical Physics,* v. 27, Oct. 1957, p. 914-917.

The rate constant is 1.3×10^{10} M^{-1} sec^{-1}.

2006 Evaluation of Force Constants of Tetrahedral Hydrides From Raman and Infrared Data. C. W. F. T. Pistorius. *Journal of Chemical Physics,* v. 27, Oct. 1957, p. 965-967.

2007 (French.) Electronegativities and Surface Phenomena. **Électronégativités et phénomènes de surface.** M. Haissinsky. *Journal de Chimie Physique,* v. 54, Sept. 1957, p. 655-658.

Calculation of heats of adsorption on metal surfaces by means of electrochemical electronegativities. Stevenson's relationship between electronegativity and electron extraction was verified for alkali metals, alkaline-earth metals, and metals with electronegativity lower than two.

2008 Purification and Surface Tension Properties of Alkyl Sodium Sulfosuccinates. E. F. Williams, N. T. Woodberry, and J. K. Dixon. *Journal of Colloid Science,* v. 12, Oct. 1957, p. 452-459.

Purification by crystallization and slurry adsorption. Relationship of critical micelle concentration of chain length of the alkyl group. A consideration of the nature of the surface tension-concentration curve near the critical concentration indicates that micelle formation and surface hydrolysis occur below the critical micelle concentration.

2009 Effect of the Cation on Micelle Formation by Sulfonates in Benzene. Samuel Kaufman and C. R. Singleterry. *Journal of Colloid Science,* v. 12, Oct. 1957, p. 465-479.

The states of aggregation of dinonylnaphthalene sulfonates of ten cations (Li, Na, Cs, NH_4, Mg, Ca, Ba, Zn, Al, and H) were studied in benzene by fluorescence depolarization, cryoscopy, viscometry, and densimetry.

2010 X-Ray Small-Angle Scattering of Carbon Blacks. Haruo Kuroda. *Journal of Colloid Science,* v. 12, Oct. 1957, p. 496-509.

Intensity curves for the X-ray small-angle scattering of several carbon blacks are analyzed by Hosemann's theory and Porod's theory. The particle size distribution is estimated from the small-angle scattering and is compared with electron micrograph data.

2011 Deflocculation in Hydrocarbon Oils. A. Bondi and H. Diamond. *Journal of Colloid Science,* v. 12, Oct. 1957, p. 510-522.

Exploratory electrical conductivity experiments on the deflocculation of neutral and acidic carbon blacks in hydrocarbon solvents have demonstrated the importance of specifying the nature of the surface of a suspensoid in dispersion tests. All the additives examined in aromatic-free solvent deflocculated acidic carbon black more effectively than neutral carbon black.

2012 Electronic Control of Steric Hindrance in Hindered Phenols. Louis A. Cohen. *Journal of Organic Chemistry,* v. 22, Nov. 1957, p. 1333-1335.

2,6-Di-*tert*-butylphenols with electronegative substituents in the *para* position were prepared and found readily soluble in aqueous alkali. Phenomenon is explained in terms of facilitation of charge dispersion. The corresponding highly hindered anisoles were prepared.

2013 The Radiation Chemistry of Methane. G. G. Meisels, W. H. Hamill, and R. R. Williams, Jr. *Journal of Physical Chemistry,* v. 61, Nov. 1957, p. 1456-1461.

Study of mixtures with Ar or Kr using 50 k.e.v. X-rays or 1 m.e.v. electrons.

2014 Radiation Chemistry of Organic Compounds. I. *n*-Alkane Liquids. H. A. Dewhurst. *Journal of Physical Chemistry*, v. 61, Nov. 1957, p. 1466-1471.

Compounds from pentane to hexadecane were irradiated with 800 kvp. electrons. The H yield was found to be independent of the length of the C atom chain, whereas the methane yield decreased with increase in the length of the C atom chain.

2015 The Effect of Solutes on the Radiolysis of Cyclohexane. Robert H. Schuler. *Journal of Physical Chemistry*, v. 61, Nov. 1957, p. 1472-1476.

Low concentrations of solutes which have high electron affinities, such as iodine, the alkyl halides, and SO_2, decrease the H yield in the γ-irradiation of cyclohexane by about 40%. This is believed due to a transfer of energy to the solute, probably by an electron capture mechanism.

2016 A Survey of the Radiation Chemistry of Some Aliphatic Ethers. Amos S. Newton. *Journal of Physical Chemistry*, v. 61, Nov. 1957, p. 1485-1490.

Products resulting from the irradiation of seven liquid aliphatic ethers with He ions were determined. The alkyl-oxygen bond was the most susceptible to rupture.

2017 Low Temperature Heat Capacity and Entropy of Crystalline Orthophosphoric Acid. Edward P. Egan, Jr. and Zachary T. Wakefield. *Journal of Physical Chemistry*, v. 61, Nov. 1957, p. 1500-1504.

At 298.16 K the heat content of the anhydrous crystals, H_3PO_4 is 4059 cal. mole^{-1} and the entropy is 26.41 cal. deg.$^{-1}$ mole^{-1}. The corresopnding values for the hemihydrate crystals, $2H_3PO_4 \cdot H_2O$ are 9569 cal. mole^{-1} and 61.73 cal. deg.$^{-1}$ mole^{-1}.

2018 Comparison of Free Energy of Immersion Values From Adsorption Measurements on Loose and on Compressed Powders. R. G. Craig, J. J. Van Voorhis, and F. E. Bartell. *Journal of Physical Chemistry*, v. 61, Nov. 1957, p. 1520-1521.

2019 Standard Heat Capacities of Gaseous Methanol, Ethanol, Methane and Ethane at 279°K. by Thermal Conductivity. J. O. Halford and George A. Miller. *Journal of Physical Chemistry*, v. 61, Nov. 1957, p. 1536-1539.

2020 The Crystal Structures of the Monosilicides of Osmium, Iridium and Ruthenium. William L. Korst, Lies N. Finnie, and Alan W. Searcy. *Journal of Physical Chemistry*, v. 61, Nov. 1957, p. 1541-1543.

2021 The Temperature Dependence of the Soret Coefficient of Aqueous Potassium Chloride. L. G. Longsworth. *Journal of Physical Chemistry*, v. 61, Nov. 1957, p. 1557-1562.

Aqueous solutions of KCl were studied at concentrations from 1 to 4 M over the temperature interval from 10 to 50 C.

2022 Thermodynamics of the Ti-Ti_2O_3 System and the Dissociation Energy of TiO and TiO_2. J. Berkowitz, W. A. Chupka, and Mark G. Inghram. *Journal of Physical Chemistry*, v. 61, Nov. 1957, p. 1569-1572.

2023* Analysis of the Near Ultraviolet Absorption Bands of Molecules Containing a Carbonyl Group. II. Cyclopentanone. I. Achyuta Rao, N. V. R. Appa Rao, and V. Ramakrishna Rao. *Journal of Scientific & Industrial Research*, v. 15, sec. B, Sept. 1957, p. 388-392.

2024* (Russian.) The Effect of the Pore Size and the Hydration of Silica Surfaces on the Adsorption of Nitrogen Vapors. **Vliianie razmerov por i gidratatsii poverkhnosti kremnezemov na adsorbtsiiu parov azota.** A. V. Kiselev and E. V. Khrapova. *Kolloidnyi Zhurnal*, v. 19, no. 5, Sept.-Oct. 1957, p. 572-583.

The absolute adsorption isotherms for silica gels with effective pore diameters larger than 40 Å coincide; in the presence of smaller pores an increase in the N adsorption potential is observed. Dehydration of the silica surface lowers the adsorption of N vapor at small surface coverages.

2025* (German.) Empirical Relationships Between the Flow Curves of High Molecular Solutions and the Properties of Dissolved Molecules. **Empirische Zusammenhänge zwischen den Fliesskurven hochmolekularer Lösungen und den Eigenschaften der gelösten Moleküle. I.** J. Schurz. *Kolloid Zeitschrift*, v. 154, Oct. 1957, p. 97-103.

A short survey of the present knowledge of non-Newtonian viscosity; causes, measurement, and interpretation. Flow curves and approximate formulas.

2026* (German.) The Fractionating Coagulation of Phenol Formaldehyde Resins With Aqueous Electrolytic Solutions. **Über die fraktionierende Koagulation der Phenol-Formaldehyd-Harze mit wässrigen Elektrolytlösungen.** A. Buzágh, Katharina Udvarhelyi, and F. Horkay. *Kolloid Zeitschrift*, v. 154, Oct. 1957, p. 130-141.

In the coagulation of alcoholic resin solutions with aqueous electrolytic solutions, the water content of the system is important. The greater the water content, the smaller the mol. wt. of the fractions.

2027* (Hungarian.) The Effect of Ultrasound on Increase in Diffusion. **Újabb vizsgálatok az ultrahang diffúziónövelo hatására.** Tamás Tarnóczy and Gyula Tamás. *Magyar Fizikai Folyóirat*, v. 5, no. 3, 1957, p. 237-243.

The effect of ultrasound on diffusion through a cellophane membrane. Special behavior of diffusion when irradiation comes from below the membrane.

2028* (English.) **Vapour-Liquid Equilibria: System Acetone-Benzene-Cyclohexane.** K. V. Kurmanadharao, V. V. G. Krishnamurty, and C. Venkatarao. *Recueil des Travaux Chimiques des Pays-Bas*, v. 76, nos. 9-10, Sept.-Oct. 1957, p. 769-778.

2029 Apparatus for Measuring Very Low Interfacial Tensions. H. Y. Jennings, Jr. *Review of Scientific Instruments*, v. 28, Oct. 1957, p. 774-777.

Using a pendent drop apparatus, interfacial tensions as low as 0.001 d/cm have been measured at 25 C in a water-oil system. These measurements were made possible through the combined use of small drop-forming tips, long working distance objectives, electronic flash illumination, and Polaroid Land film.

2030 (French.) Ion Exchange. **L'échange d'ions.** Y. L. Gladel. *Revue de l'Institut Français du Pétrole et Annales des Combustibles Liquides*, v. 12, no. 9, Sept. 1957, p. 936-943.

Nature and structure of ion exchangers, theory and mechanism of ion exchange, and practical uses.

2031* The Statistical Thermodynamics of Mixtures of Lennard-Jones Molecules. I. Random Mixtures. II. Deviations From Random Mixing. W. B. Brown. *Royal Society of London, Philosophical Transactions*, v. 250, ser. A, no. 976, Oct. 17, 1957, p. 175-246.

Assumption of random mixing is sufficient to relate the thermodynamic properties of the mixture exactly to those of a reference substance, after the manner of the law of corresponding states.

2032 Crystal Distortion in Ferrite-Manganites. G. I. Finch, A. P. B. Sinha, and K. P. Sinha. *Royal Society, Proceedings*, v. 242, ser. A, Oct. 8, 1957, p. 28-35.

Origin of the distortion of spinels from cubic to tetragonal symmetry is examined in the case of Cu ferrites and a series of manganite-ferrite systems. Degree of distortion depends on temperature and the net fraction of cations forming appropriately orientated dsp^2 bonds in octahedral sites.

2033 Ultrasonic Relaxation in the Study of Rotational Isomers. M. S. de Groot and J. Lamb. *Royal Society, Proceedings*, v. 242, ser. A, Oct. 8, 1957, p. 36-56.

The ultrasonic absorption in a series of unsaturated aldehyde and ketone liquids was measured over the frequency range 5 to 200 Mc. per sec. The observed relaxational behavior is attributed to perturbation by the sound wave of an equilibrium between rotational isomers.

2034 The Flash Photolysis of Ozone. W. D. McGrath and R. G. W. Norrish. *Royal Society, Proceedings*, v. 242, ser. A, Nov. 5, 1957, p. 265-276 + 4 plates.

Using an excess of inert gas to obtain isothermal conditions, it was possible to observe Schumann-Runge absorption of oxygen molecules in their ground electronic state, with up to 16 quanta of vibrational energy.

2035* (French.) Relationships Between the Structure of Organic Compounds and Their Boiling Points. **Relations entre la structure des composés organiques et leur point d'ébullition.** Louis Poizat. *Société Chimique de France, Bulletin*, 1957, no. 10, Oct., p. 1111-1115.

For each organic compound a number N was determined allowing calculation of the boiling point with the general formula $E=\frac{\log N-A}{B}$. A and B remain the same for each chemical family and characterize it. Determination of N, A, and B is considered.

2036* (French.) Infra-Red Study of Some Pyruvic Acid Derivatives. **Étude infrarouge de quelques dérivés de l'acide pyruvique.** Marie-Louise Josien, Monique Joussot-Dubien, and Jean Vizet. *Société Chimique de France, Bulletin*, 1957, no. 10, Oct., p. 1148-1152.

2037* (Russian.) Polarographic Investigations in Molten Borax. **Poliarograficheskoe issledovanie na fone rasplavlennoi bury. I.** Polarography of Copper and Cadmium. **Poliarografiia medi i kadmiia.** Iu. K. Delimarskii and K. M. Kalabalina. *Ukrainskii Khimicheskii Zhurnal*, v. 23, no. 5, 1957, p. 584-592.

Behavior of Cu and Cd oxides in molten borax.

2038* (Russian.) Determination of the Solubility Products of the Hydroxyquinolates of Gallium, Indium, and Thallium. **Opredelenie proizvedenii rastvorimosti oksikhinoliatov galliia, indiia i talliia.** I. V. Piatnitskii and A. P. Kostyshina. *Ukrainskii Khimicheskii Zhurnal*, v. 23, no. 5, 1957, p. 599-601.

Studying the solubility of the hydroxyquinolates in acetate buffer solutions, and in acetic acid solutions of hydroxyquinoline.

2039* (German.) Studying the Silicon-Nitrogen System. **Zur Kenntnis des Systems Silicium-Stickstoff.** Oskar Glemser, Klaus Beltz, and Peter Naumann. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 291, no. 14, Sept. 1957, p. 51-66.

Study of the polymorphic modifications, α-Si_3N_4 and β-Si_3N_4. Behavior of Si_3N_4 in the presence of acids, bases, oxygen, steam, Cl, and Fe.

2040* (German.) Raman Spectrum and Structure of Tetrametaphosphate Ions. **Raman-Spektrum und Struktur des Tetrametaphosphat-Ions.** E. Steger and A. Simon. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 291, no. 14, Sept. 1957, p. 76-88.

Study of the spectra of solutions of $Na_4P_4O_{12}$, $K_4P_4O_{12}$, and $(NH_4)_4P_4O_{12}$.

2041* (German.) The Speed of Vaporization of White Phosphorus. **Zur Verdampfungsgeschwindigkeit des weissen Phosphors.** H. Ramthun and I. N. Stranski. *Zeitschrift für Elektrochemie*, v. 61, no. 7, 1957, p. 819-826.

A process for measuring rates of vaporization by means of the radioactive isotope P^{32}, between -20 and 20 C. Records the increasing gas activity during vaporization in an evacuated tank.

2042* (German.) Effect of the Medium on Intensity of the Raman - Resonance Line of p-Nitroaniline. Acetone - Benzene, Acetone-Benzene-Calcium Nitrate. **Einfluss des Mediums auf die Intensität der Raman-Resonanzlinie des p-Nitroanilins. Aceton-Benzol, Aceton-Benzol-Calcium nitrat.** Stefan Minc and Stanisław Kurowski. *Zeitschrift für Elektrochemie*, v. 61, no. 7, 1957, p. 833-836.

Effect of intermolecular forces on intensity of resonance line $NO_2 = 1335$ cm^{-1} of p-nitroaniline as a function of concentration of benzene in the solvent.

2043* (German.) Kinetics of the Rearrangement of Tetravalent Niobium in Chloride Solution. **Die Kinetik der Disproportionierung des vierwertigen Niobs in salzsaurer Lösung.** D. Cozzi, S. Vivarelli, and M. Di Stefano. *Zeitschrift für Elektrochemie*, v. 61, no. 7, 1957, p. 849-851.

Study of effect of temperature and activity of the acid on the velocity constant of the disproportionation of Cb(IV) to Cb (III) and Cb(V). Determination of the frequency factor and activation energy.

2044* (Russian.) Determination of the Free Energy of Oxygen in the Surface Layers of Oxidation Catalysts. **Opredelenie svobodnoi energii kisloroda v poverkhnostnom sloe okislitel'nykh katalizatorov. I.** N. V. Kul'kova and M. I. Temkin. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 9, Sept. 1957, p. 2017-2025.

2045* (Russian.) Kinetics of the Hydrolysis of Some Complex Compounds of Bivalent Platinum. **Kinetika gidroliza nekotorykh kompleksnykh soedinenii dvukhvalentnoi platiny.** A. A. Grinberg and Iu. N. Kukushkin. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 10, Oct. 1957, p. 2360-2367.

Hydrolysis of K_2PtCl_4, $KPtNH_3Cl_3$, and $Pt(NH_3)_3Cl$ through the hydration of the complex compound. The hydration determines the speed of hydrolysis with the separation of a proton from the water molecule entering into the complex.

2046* (Russian.) Catalytic Action Mechanism of Aluminum Chloride. **O mekhanizme kataliticheskogo deistviia khloristogo aliuminiia. V.** Reaction Tendencies of the Aromatic Compounds During Alkylation. **Reaktsionnaia sposobnost' aromaticheskikh soedinenii pri ikh alkilirovanii.** N. N. Lebedev. *Zhurnal Obshchei Khimii*, v. 27, no. 9, Sept. 1957, p. 2460-2469.

Reactivity of 21 aromatic compounds during alkylation with cyclohexyl chloride in the presence of $AlCl_3$. Determination of activation energy.

2047* (Russian.) Poisonous Action of Certain Silanes on Platinum Catalysts. **Otravliaiushchee deistvie nekotorykh silanov na platinovyi katalizator.** A. F. Plate and N. A. Belikova. *Zhurnal Obshchei Khimii*, v. 27, no. 9, Sept. 1957, p. 2469-2473.

Study of poisoning action at various temperatures and silicohydrocarbon concentrations in cyclohexane solutions.

2048* (English.) **Studies on Eders Reaction. I. Sensitisation by Halogens.** K. S. Murty and G. Gopala Rao. *Zeitschrift für Physikalische Chemie (Leipzig)*, v. 207, nos. 3-4, Aug. 1957, p. 167-179.

Capability of the oxalate ion radical to initiate the chain reaction between $HgCl_2$ and oxalate, as well as the sensitization of this reaction by Cl and Br were studied.

2049* (English.) **Kinetics of Oxidation of Glucose and Fructose by Alkaline Bivalent Copper in Presence of Citrate. III. Kinetics of Oxidation of Dextrose, Galactose and Fructose, *l*-Abrabinose, and *d*-Xylose by Alkaline Bivalent Copper in Presence of Tartarate. IV.** M. P. Singh and S. Ghosh. *Zeitschrift für Physikalische Chemie (Leipzig)*, v. 207, nos. 3-4, Aug. 1957, p. 187-204.

Study of the reduction of cupric citrate complex by glucose and fructose in the presence of an alkali. Effect of temperature on the reaction velocity for hexose, galactose, and fructose and the two pentoses, l-arabinose and *d*-xylose.

2050* (English.) **A Study of the Factors That Determine the Primary Particle Size of Crystalline Insoluble Metal Salt Precipitates.** A. Packter. *Zeitschrift für Physikalische Chemie (Leipzig)*, v. 207, nos. 3-4, Aug. 1957, p. 210-222.

An experimental study of the effect of variation in supersaturation and relative concentration of the reacting ions, temperature, and rate of stirring on the primary particle size of precipitates of crystalline insoluble metal salts.

2051* (German.) Relation Between *pH* Content and the Temperature of Dissociation of Azidomethemoglobin. **Die *pH*-und Temperaturabhängigkeit der Dissoziation des Methämoglobinazids.** Robert Havemann and Werner Haberditzl. *Zeitschrift für Physikalische Chemie (Leipzig)*, v. 207, nos. 3-4, Aug. 1957, p. 273-287.

See also: **1712** (determination of heat of vaporization); **2654** (heat capacity of Tb); **2953** (determination of distribution functions).

COATINGS

2052 Observations on the Physical Appearance of Chemically Attacked Glassed Steel Surfaces. D. K. Priest. *American Ceramic Society Bulletin*, v. 36, Nov. 1957, p. 416-418.

In the vapor phase over boiling 20% HCl, chemical attack of a glass surface consisting of fused particles of a borosilicate glass

occurs perferentially at the joining lines of the fused particles of glass frit. Frit boundaries are formed in fusing glass frit onto steel. Their morphology is dependent of frit particle size.

2053 Some Experiments in Comparing the Resistance of Enamels to Corrosion by Alkaline Solutions. H. B. Kirkpatrick, E. L. McGandy, and J. C. Richmond. *American Ceramic Society, Journal,* v. 40, Nov. 1957, p. 389-395.

Effects of solution temperature, concentration, container material, and specimen position on the rate of dissolution of sheet-steel and cast-iron enamels by alkaline solutions. In designing apparatus to measure such corrosion rates the solution temperature should be controlled to at least ± 0.1 C, no glass parts of the apparatus should be exposed to the solution, and in the absence of stirring, consideration should be given to the positioning of the specimens.

2054 Protective Organic Coatings for Steel. Louis J. Nowacki and E. R. Mueller. *American Iron and Steel Institute, Preprint,* 1957, 13 p. (TS300 Am35ta Vis.)

A general survey designed to give some insight into the makeup of paints, variety of coating materials that are available, and how paints differ in type and end use.

2055* (Dutch.) Protection of Iron and Steel by Means of a Coating. **Bescherming van ijzer en staal door verf.** H. E. Wulkan. *Bedrijf en Techniek,* v. 12, no. 289, Oct. 5, 1957, p. 691 + 2 pages.

Iron corrosion and anticorrosive methods; pretreatment of the metal surface. Different types of coatings. Correct coating application.

2056 X-Ray Study of the Sulfurizing of Steel. Iu. M. Vinogradov and V. D. Zelenova. *Henry Brutcher Translation No.* 4032, 6 p. (From *Zavodskaia Laboratoriia,* v. 23, no. 6, 1957, p. 697-698.) Henry Brutcher, Altadena, Calif.

Comparison of X-ray spectra of surface layers of specimens of 0.45% plain C steel sulfurized in nine different baths. Procedure for X-ray analysis and testing for frictional wear. Composition of sulfurizing baths.

2057* (French.) Anticorrosive Cable Protection. **Protection des cables contre la corrosion.** M. Osty. *Corrosion et Anticorrosion,* v. 5, no. 10, Oct. 1957, p. 294-298.

A study of various coatings for cables, based on plastic materials, polyethylene, vinyl polychloride, or a complex made of glass and bitumen. Testing specimens by electrolysis in an acid medium.

2058* (Russian.) Use of Radioactive Isotopes in Studying the Mechanism of the Basic Processes in Hot Tinplating. **Primenenie radioaktivnykh izotopov pri issledovanii mekhanizma osnovnykh protsessov goriachego luzheniia.** A. I. Vitkin. *Doklady Akademii Nauk SSSR,* v. 115, no. 4, Aug. 1, 1957, p. 710-713 + 1 plate.

Study of the movement of Sn and Fe in the flux by means of tracers, which were introduced into the bath.

2059* (Russian.) Solubility of Iron Oxides in Melted Silicates With or Without Boron. **Rastvorimost' okislov zheleza v bornykh i bezbornykh silikatnykh rasplavakh.** K. P. Azarov and V. V. Balandina. *Doklady Akademii Nauk SSSR,* v. 115, no. 6, Aug. 21, 1957, p. 1146-1147.

Determines solubility of iron oxide in typical industrial ground coat enamels with or without additions of B or Ti.

2060* Moisture Blistering of Paints on Wood. J. J. G. Veer. *Forest Products Journal,* v. 7, Oct. 1957, p. 342-344.

Blistering will result without a temperature gradient through a painted panel if it is continuously wet from the back. For water vapor to cause blistering, the temperature difference must be sufficient to cause condensation at the paint-film interface.

2061 Oxidative Degradation of Epoxy Resin Coatings. W. R. R. Park and Jesse Blount, Jr. *Industrial and Engineering Chemistry,* v. 49, Nov. 1957, p. 1897-1902.

Parameters investigated included air-dry time, duration and severity of curing cycle, film thickness, and resin molecular weight.

2062* (Russian.) The Influence of the Molecular Weight of Film-Forming Materials, Solvents, and Plasticizers on Stress in Varnish Coatings. **Vliianie molekuliarnogo vesa plenkoobrazuiushchikh veshchestv, rastvoritelei i plastifikatorov na napriazheniia v lakovykh plenkakh.** M. I. Kariakina, V. A. Kargin, and T. I. Sogolova. *Khimicheskaia Promyshlennost',* 1957, no. 5, July-Aug., p. 265-268.

The effect of the mol. wt. of film-forming materials on stresses developing in lacquer coatings was analyzed at various temperatures, and the results are shown graphically.

2063* (German.) Silicones for the Protection of Buildings. **Silikone im Bautenschutz.** Ewald Pirson. *Kunststoffe,* v. 47, no. 10, Oct. 1957, p. 597-600.

Mechanism of silicone impregnation; availability of sodium methyl silicone products in solution as well as in aqueous dispersion form; use of these products in the protection of buildings.

2064 Science for the Coatings Technologist. VIII. Green Pigments. E. S. Beck. *Metal Finishing,* v. 55, Nov. 1957, p. 50-55.

Considers chrome green, chromium oxide green, hydrated chromium oxide green, and green phosphomolybdic acid and phosphotungstic acid toners. (To be continued.)

2065 Practical Metalizing of Technical Ceramics. Raymond C. Steffey. *Metal Finishing,* v. 55, Nov. 1957, p. 56-61.

Preparation for metalizing; applying the conductive film; firing or curing of the metalized pattern; kiln design; ware inspection after firing; pattern spread and staining; electroplating; tinning.

2066* Methods Used in the Performance Testing of Paint. IV. Gloss, Hiding Power, Reflectance. W. V. Moore. *Metal Finishing Journal,* v. 3, Oct. 1957, p. 389-395.

(To be continued.)

2067* A Survey of Abrasion Resistance Tests for Vitreous Enamels. J. A. Clarke. *Metal Finishing Journal,* v. 3, Oct. 1957, p. 408 + 5 pages.

2068* Enamelling of Aluminium. A. Biddulph. *Metal Finishing Journal,* v. 3, Oct. 1957, p. 418-424.

Metal preparation; castings; milling; application; drying; firing.

2069* (German.) "Prefluxing" in Hot Galvanizing. **"Prefluxing" beim Feuerverzinken.** H. Bablik and M. Behlolavy. *Metalloberfläche,* v. 11, no. 10, Oct. 1957, p. 313-315.

Effect of the pretreatment on the hard Zn formation. Phenomena occurring during the drying process. Iron salts in the pickling solution. Pickling temperature and drying time.

2070* (German.) Further Development of the Metal Spraying Method. **Weiterentwicklung der Metallspritztechnik. IV.** H. Reininger. *Metalloberfläche,* v. 11, no. 11, Nov. 1957, p. 361-365.

Anticorrosive coatings; protection against scaling; metallized layers. Repairs and preparation. Control of the sprayed layers.

2071* Instrumental Color Reproduction of Paint. *Official Digest. Federation of Paint and Varnish Production Clubs,* v. 29, Nov. 1957, p. 1062-1068.

Color-measuring instruments are able to do an excellent job with non-metameric colors in reproducing color standards from measurements taken some time previously.

2072* Anti-Rust Additives in Primer Paints. *Official Digest. Federation of Paint and Varnish Production Clubs,* v. 29, Nov. 1957, p. 1077-1085.

Thirteen compounds were tested.

2073* The Color Stability of Red Iron Oxide Pigments. *Official Digest. Federation of Paint and Varnish Production Clubs,* v. 29, Nov. 1957, p. 1144-1152.

Eleven representative type red oxide pigments were exposed in an exterior alkyd enamel at a pigment volume concentration of 15%.

2074* Effect of Solvent Properties on the Viscosity of Alkyd Resin Solutions. W. W. Reynolds and H. J. Gebhart, Jr. *Official Digest. Federation of Paint and Varnish Production Clubs,* v. 29, Nov. 1957, p. 1174-1196.

2075* (German.) Preparation of Articles for Protective Coatings, Especially for Corrosion Resistant Coatings. **Vorbereitung von Anstrichobjekten, besonders für korrosionsschützende**

Anstriche. H. Strezelba. *Plaste und Kautschuk*, v. 4, no. 9, Sept. 1957, p. 357-359.

Preparation of articles made from steel, light metals, and wood.

2076* Phosphating Processes and Their Applications in Metal Finishing. V. Process Control. D. F. Fishlock. *Product Finishing*, v. 10, Oct. 1957, p. 84 + 10 pages.

Control requirements; solution control; laboratory analyses; sampling methods; quality control; standard and rapid tests; performance, weathering, salt-spray, humidity, and weatherometer tests.

2077 Plastisol Coating of Plating Racks and Tanks—A Job for Specialists. Ezra A. Blount. *Products Finishing*, v. 22, Nov. 1957, p. 34-42.

Details of modern spray and dip coating plant's facilities and operations.

2078 The Hinac Process—A Substitute for Tinplate. *Products Finishing*, v. 22, Nov. 1957, p. 76 + 2 pages.

The Hinac Process produces an inorganic coating that consists essentially of Cr compounds. This coating is water insoluble, and offers excellent chemical resistance, particularly to alkaline media. It is equal to tinplate in economy and performance.

2079 (German.) Technical Application Problems in the Use of Epoxy-Resin Lacquers. **Anwendungstechnische Probleme bei der Verwendung von Epoxy-Lackharzen.** Th. Hirschi. *Schweizer Archiv für Angewandte Wissenschaft und Technik*, v. 23, no. 10, Oct. 1957, p. 318-327.

Properties and peculiarities of lacquers based on epoxy-resins.

2080 Oxidation-Resistant Coatings for Molybdenum. D. V. Doane. *Wright Air Development Center, Aeronautical Research Laboratory, WADC Technical Report* 54-492, Apr. 1957, 94 p. (TL507 Un3.18w Vis.)

Evaluation tests on unalloyed Mo and 0.5% Ti-Mo alloy coated with: Ni-Cr-B, Al-Cr-Si, and Ni-Si-B sprayed metal coatings; composite coating of the latter two; electroplated Cr; electroplated Cr-Ni composite; Ni cladding.

2081 Resistance of Protective Coatings to Synthetic Lubricating and Hydraulic Fluids. Robert W. Damm, George F. Salathe, and William A. McIntyre. *Wright Air Development Center, Materials Laboratory, WADC Technical Report* 56-80, Sept. 1957, 140 p. (TL507 Un3.18w Vis.)

Evaluation of resistance of 56 coatings to 5 synthetic fluids.

2082* (German.) Structural Changes in Organic Films Produced by Electron Radiation. **Über Veränderungen des Aufbaus organischer Folien durch Elektronenbestrahlung.** Andreas Brockes. *Zeitschrift für Physik*, v. 149, no. 3, 1957, p. 353-369.

Radiation of polystyrol and nitrocellulose films about 1 sq. in. in area and 10μ thick with 70 k.e.v. electrons.

See also: **2571** (stripping solution for phosphate coatings); **2572** (metal finishing guidebook); **2930** (reflection of X-rays from metal films); **3069** (Ti-clad steel).

CONTROL SYSTEMS, COMPUTERS, AND SYSTEMS ENGINEERING

2083 Design Basis for Cascade-Type Positional Servomechanisms. Sidney Lees and T. C. Blaschke. *ASME, Transactions*, v. 79, Nov. 1957, p. 1873-1896.

Design basis attempts to coordinate specifications, dynamic characteristics, interferences, and uncertainties from a consideration of the generation of torques by the system. The concept of frequency-dependent coefficients is used.

2084 The Phase-Space Method for Analysis of Nonlinear Control Systems. Y. H. Ku. *ASME, Transactions*, v. 79, Nov. 1957, p. 1897-1903.

A feedback system with a nonlinear control function in the forward branch and with simple, integral, or derivative feedback is analyzed. Taking the actuating signal as the dependent variable, a single high-order nonlinear differential equation can be obtained.

2085* (German.) Analog Computers in Reactor Engineering. **Analogrechner in der Reaktortechnik.** G. Kourim. *Atomwirtschaft*, v. 11, Oct. 1957, p. 327-331.

Mode of operation; applications.

2086* (Ukrainian.) Equation of Invariantness for Linear Control Systems Under Random Disturbances. **Umovi invariantnosti liniinikh sistem avtomatichnogo reguliurannia pri statistichnomu zavdanni zburen'.** O. G. Ivakhnenko. *Avtomatika*, 1957, no. 3, Sept. 24, p. 32-38.

Equations show practical ways of eliminating transient and static errors of control systems. Application to random disturbances.

2087* (Ukrainian.) Approximate Methods for Determining the Frequency and Amplitude of Hunting in Optimalizing Controllers. **Nablizheni metodi viznachennia chastoti i amplitudi avtokolivan' u sistemakh ekstremal'nogo reguliuvannia.** V. M. Kuntserich and P. I. Akinin. *Avtomatika*, 1957, no. 3, Sept. 24, p. 56-69.

Two approximate methods are proposed; both apply the fundamental harmonic of Fourier's series.

2088* (Ukrainian.) On the Design and Switching Diagrams of Interruption Circuits for Fast Response Off-On Servo Systems. **Pro rozrakhunok i skhemi vkliuchennia pristroiv forsuvannia dlia shvidkodiiuchikh slidkuiuchikh sistem z staloiu shvidkistiu vikonavchogo elementa.** P. I. Dekhtiarenko. *Avtomatika*, 1957, no. 3, Sept. 24, p. 70-83.

The application of interruption circuits for fast response off-on servo systems, in particular for systems with an off-on reversing clutch.

2089* Some Aspects of Process Control Instrumentation. J. R. Halsall. *British Institution of Radio Engineers, Journal*, v. 17, Oct. 1957, p. 551-561.

Electrical methods of measuring temperature. Low-level d.c. amplifiers used in connection with thermocouple measurements based on the contact modulator, galvanometer-photocell, and galvanometer-oscillator methods. Application of vane controlled r.f. oscillators to d.c. telemetering systems and electrical force balance measurements.

2090 How to Avoid Extra Integrators When Simulating RLC Networks. Joseph Otterman. *Control Engineering*, v. 4, Nov. 1957, p. 111-114.

A method of loop analysis that yields a computer setup which makes conservative use of both amplifiers and integrators.

2091 Infrared Process-Stream Analyzers. Daniel J. Troy. *Control Engineering*, v. 4, Nov. 1957, p. 116-121.

Basics, operating details, commercial availability, and plant-stream applications.

2092 Servo Modulators. III. Semiconductor Modulators, Magnetic Modulators, and Tabulated Characteristics of Commercial Units. Basil T. Barber and L. S. Klivans. *Control Engineering*, v. 4, Nov. 1957, p. 122-131.

The typical circuits, performance characteristics, and application information for semiconductor and magnetic modulators.

2093 Earth Satellite Telemetry Coding System. R. W. Rochelle. *Electrical Engineering*, v. 76, Dec. 1957, p. 1062-1065.

The different bandwidth requirements for the various inputs from the transducers in the earth satellite led to a system which is a combination of time- and frequency-sharing telemetry.

2094* (Czech.) Servomotors and Their Control. **Servomotory a jejich řízení.** Zdeněk Dráb. *Elektrotechnik*, v. 12, no. 10, Oct. 1957, p. 322-327.

Requirements of servomotors, their various types and design. Application of electronic and magnetic amplifiers in servomotor control.

2095 The Utilization of Domain Wall Viscosity in Data-Handling Devices. V. L. Newhouse. *I. R. E., Proceedings*, v. 45, Nov. 1957, p. 1484-1492.

Digital circuit applications include a technique of continuously displaying the contents of magnetic shift registers and means of operating random access memories an order of magnitude faster than present current coincidence types.

2096 Transformer Design for Zero Phase Shift. Nathan R. Grossner. *Institute of Radio Engineers, Transactions on Component Parts*, v. CP-4, Sept. 1957, p. 82-85. (TK1 In6.6cp Vis.)

Design method for obtaining minimum phase shift between output and input of a transformer is applicable to precision reference transformers employed in analog computers and servo loops where minimum quadrature voltages are mandatory.

2097 A New Method for Generating a Function of Two Independent Variables. Lazarus G. Polimerou. *Institute of Radio Engineers, Transactions on Electronic Computers*, v. EC-6, Sept. 1957, p. 167-169. (TK1 In6.6e Vis.)

Design is of the photoformer variety and utilizes pulse techniques to obtain the advantages of accuracy, semi-automatic calibration and self-correction.

2098 An Analog Method for the Solution of Probability of Hit and Related Statistical Problems. Thomas B. Van Horne. *Institute of Radio Engineers, Transactions on Electronic Computers*, v. EC-6, Sept. 1957, p. 170-175. (TK1 In6.6e Vis.)

Approximate solutions of probability of hit problems were achieved by means of a simulation involving a masked oscilloscope and photocell for the target and samples from random noise generators for the system dispersions.

2099 A Variable Function Delay for Analog Computers. R. S. Stone and R. A. Dandl. *Institute of Radio Engineers, Transactions on Electronic Computers*, v. EC-6, Sept. 1957, p. 187-189. (TK1 In6.6e Vis.)

Design of a compact and relatively simple transport lag utilizing a synchronously-switched bank of condensers.

2100 An Automatic Data-Recording System for Aeronautical Research. Elmer M. Sharp. *Institute of Radio Engineers, Transactions on Instrumentation*, v. I-6, Sept. 1957, p. 186-191. (TK1 In6.6i Vis.)

2101 Statistical Aspect of Reliability in Systems Development. John S. Youtcheff. *Institute of Radio Engineers, Transactions on Reliability and Quality Control*, PGRQC-12, Nov. 1957, p. 25-36. (TK1 In6.6q Vis.)

2102 Hybrid Analog-Digital Computing Systems. Max Palevsky. *Instruments and Automation*, v. 30, pt. 1, Oct. 1957, p. 1877-1880.

A review of the principles of hybrid computers reveals the value of the new, fast "Multiverter" both as an information link and as an independent computing device. Inherent accuracy can be adjusted automatically to match the input frequency.

2103 Analog Integrating of Transient Waveforms. Ralph C. Leibowitz. *Instruments and Automation*, v. 30, pt. 1, Oct. 1957, p. 1881-1883.

This analog integrating system can supplement oscillographic recording in the study of transient phenomena and replace it where the integrated value, rather than the precise wave form, is of primary interest.

2104 High-Speed Commutator. Robert K. Bunce. *Instruments and Automation*, v. 30, Nov. 1957, p. 2064-2065.

Small, solid-state, high-speed, electronic commutator samples inputs from up to 100 pickups at speeds up to 30,000 samples per sec.

2105 Trends in Electrification and Automation of Iron and Steel Processes. W. E. Miller. *Iron and Steel Engineer*, v. 34, Oct. 1957, p. 83-94.

New mills and new processing lines are producing more steel more automatically and to closer tolerances. Advances are due to higher power, better control, and automatic computer systems.

2106 Application of Static Switching in the Steel Industry. D. L. Pierce. *Iron and Steel Engineer*, v. 34, Nov. 1957, p. 113-125.

Adoption of relatively complex automatic control of mills is justified by increase in quality production because of consistent and accurate control of the mill at its optimum efficiency.

2107* (English.) **Developments and Trends in the Field of Measuring Techniques, Data-Transmission, and Data-Handling in Connection With Automation.** C. J. D. M. Verhagen. *IVA Tidskrift för Teknisk-Vetenskaplig Forskning*, v. 28, no. 6, 1957, p. 249-262.

Covers research in guiding, controlling, machining, assembly, and management. The trend in instruments is toward improved reliability and flexibility, better dynamic behavior, and integration of automatic measuring, counting, and computing instruments with installations, machines, and devices in plants, workshops, and offices.

2108 Process Instruments and Controls Handbook. Douglas M. Considine, editor. Sections individually paged. 1957. McGraw-Hill, New York. (Q185 C76p)

Operating and design fundamentals of measurement and automatic control systems used in the process fields. Covers measurement standards, primary elements, measurement systems, indicators, and recorders, automatic controllers, timers and program controllers, electric and pneumatic telemetering, final control elements, fundamental principles of process control, and mathematical techniques for solving automatic control problems.

2109 Stepping Relays. V. E. James. *Product Engineering*, v. 28, Nov. 11, 1957, p. 101-105.

Where ordinary electrical relays only make or break, a stepping relay can energize up to 100 load-carrying circuits in sequence. It will work at speeds up to 75 contacts per sec., tally signals received, and track down one circuit out of many.

2110 The Punched Card Annual of Machine Accounting and Data Processing. v. VI. 216 p. 1957. Gille Associates, Detroit. (HF5371 P96)

Summary of developments since 1945. International survey of computer equipment. Material of general interest to management. Case histories of current successful applications. Tips on forms and on tabulating. Directory of educational institutions, associations, computer centers, and equipment manufacturers. Industry news and notes.

2111* (German.) A New Electrical Regulator. **Ein neuer elektrischer Regler.** Karl Schlick. *Siemens Zeitschrift*, v. 31, nos. 10-11, Oct.-Nov. 1957, p. 482-486.

A new regulator for heat and process control equipment provides reinforcement of the control variation by means of amplifiers.

2112* (Norwegian.) The Measurement of Simple Position Servo Mechanisms. **Dimensjonering av enkle posisjonservoer.** Rolf Axelsen. *Teknisk Ukeblad*, v. 104, no. 39, Oct. 24, 1957, p. 863-868.

Linear field of the servomotor properties. Friction and tachometer attenuation. A simple formula for measuring a servomotor, based on the load and signal parameters. Discussion of the motor effect. Determining factors for static and dynamic accuracy.

2113* (Russian.) On the Theory of Work of the Receiving Apparatus at Repeated Cyclic Telemeasurements. **K voprosu o teorii raboty priemnogo ustroistva pri mnogokratnykh tsiklicheskikh teleizmereniiakh.** V. N. Zhilin. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 10, Oct. 1957, p. 2392-2397.

Theoretical analysis of a tube scheme with a "memory" capacitor by means of series integration, which permits solution of problems for both steady and transient conditions.

See also: **1552** (inertial navigation system); **2264** (computer for fluid flow transients); **2438** (pneumatics in automation); **2593** (automatic foundry sand control); **2599** (automation in heat treating).

ELECTRICAL ENGINEERING

2114* The Brown Boveri Oil-Pressure Detector Employed for Fault Detection During Impulse Tests on Transformers. B. Gänger. *Brown Boveri Review*, v. 44, Aug. 1957, p. 336-342.

Concludes that the oil-pressure detector is ideally suitable for impulse tests and when employed in conjunction with a fast-sweep oscillograph, it is impossible for a failure to remain unnoticed.

2115 An Absolute Determination of Resistance. M. Romanowski and N. Olson. *Canadian Journal of Physics*, v. 35, Nov. 1957, p. 1312-1342.

The absolute unit determined from a total of over 100 measurements agrees very closely with units resulting from similar work done in other laboratories.

2116 Grounding Techniques for Personnel and Equipment Protection. H. E. Heddesheimer. *Electrical Engineering*, v. 76, Dec. 1957, p. 1066-1071.

2117* Analysis and Elimination of Corona Effects. C. E. Mercier and W. E. Elliott. *Electrical Manufacturing*, v. 60, Nov. 1957, p. 140-145.

2118* (Russian.) Development of Electric Drives During the Past 40 Years in the Soviet Union. **Razvitie elektroprivoda za 40 let sovetskoi vlasti.** N. A. Tishchenko and V. S. Tulin. *Elektrichestvo*, 1957, no. 11, Nov., p. 16-24.

2119* (Russian.) Electrical Engineering and Design Problems in Constructing Large Cyclic Accelerators. **Elektrotekhnicheskie i konstruktivnye problemy sooruzheniia krupnykh tsiklicheskikh uskoritelei.** F. K. Arkhangel'skii, et al. *Elektrichestvo*, 1957, no. 11, Nov., p. 25-34.

Contribution to the development of the cyclic accelerators requiring solution of complicated physical, electrotechnical, radiotechnical, and other problems. Operating principles and basic features of various types of accelerators.

2120* (Russian.) Measuring the Steady-State Stability of a Single-Circuit 400 kv. Transmission System. **Ispytaniia staticheskoi ustoichivosti odnotsepnoi elektroperedachi 400 kv.** S. A. Sovalov. *Elektrichestvo*, 1957, no. 11, Nov., p. 58-64.

Experiments to determine the limit of the static stability of a single-circuit transmission system. Determined minimum static stability permits the complete utilization of the carrying capacity of the system.

2121* (Russian.) Calculation of Generator Used in Overvoltage Conditions. **O raschete generatora v perenapriazhennom rezhime.** S. I. Evtianov. *Elektrosviaz'*, v. 11, no. 11, Nov. 1957, p. 52-58.

Mathematical analysis.

2122* (German.) Instrument Transformer Measuring Device for Higher Frequencies. **Wandlermesseinrichtung für höhere Frequenzen.** Gerhard Busse and Hans-Jochen Hoffmann. *ETZ, Elektrotechnische Zeitschrift*, v. 78, Ausgabe A, no. 21, Nov. 1957, p. 789-792.

Description of an apparatus for evaluating the errors of instrument transformers at frequencies between 16 and 500 Hz. Application of a new oscillographic zero indicator instead of the vibration galvanometer.

2123* Electrical Engineers Develop a New Concept for Multi-Path, Direct Current Armature Windings. William E. Menzies. *General Motors Engineering Journal*, v. 4, Oct.-Dec. 1957, p. 14-16.

Describes a multi-plex wave winding which eliminates undesirable equalizing currents and heating losses.

2124 The Measurement of the Surface Tension and Interfacial Tension of Insulating Oils. L. Massey, N. N. Murty, and C. N. Thompson. *Institute of Petroleum, Journal*, v. 43, Oct. 1957, p. 282-287.

Some suggested improvements on existing method.

2125 Dielectric Films in Aluminum and Tantalum Electrolytic and Solid Tantalum Capacitors. John Burnham. *Institute of Radio Engineers, Transactions on Component Parts*, v. CP-4, Sept. 1957, p. 73-82. (TK1 In6.6cp Vis.)

Electron photomicrographs of the electrolytic oxide film on Al, as well as X-ray diffraction and direct electrical measurements of the dry oxide film, reveal that it is crystalline γ-Al_2O_3. Characteristics of electrolytic Ta_2O_5 films on Ta are compared with those on Al and the factors that make Ta capacitors more reliable are indicated.

2126 Bounds for Thermistor Compensation of Resistance and Conductance. A. B. Soble. *Institute of Radio Engineers, Transactions on Component Parts*, v. CP-4, Sept. 1957, p. 96-101. (TK1 In6.6cp Vis.)

Shows how to compensate the exponential relation between thermistor resistance and temperature by means of two constant resistances, so that the compensated resistance becomes an S curve winding around an oblique straight line, or by means of three constant resistances, so that the compensated conductance becomes such an S curve.

2127 Measurement of the Temperature Coefficient of Capacitance and Inductance Over the Range of 5 to 50 MC. Isidore Bady. *Institute of Radio Engineers, Transactions on Instrumentation*, v. I-6, Sept. 1957, p. 199-205. (TK1 In6.6i Vis.)

2128* A Deep Electrolytic Tank for the Solution of 2- and 3-Dimensional Field Problems in Engineering. E. R. Hartill, J. G. McQueen, and P. N. Robson. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. A, no. 17, Oct. 1957, p. 401-413.

2129* Electrical Process Heating. A Review of Progress. O. W. Humphreys and R. Smith. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. A, no. 17, Oct. 1957, p. 449-456.

Sources of heat and power; resistance furnace processes; dielectric-heating processes; radiant heating.

2130 Effects of Electrode Materials and Surface Preparation on CdS-Metal Contacts. R. A. Greiner, R. F. Miller, and R. C. Retherford. *Journal of Applied Physics*, v. 28, Nov. 1957, p. 1358-1359.

Rectifying contacts are influenced by the surface preparation prior to electrode application. An artificially roughened or naturally rough crystal surface tends to reduce the rectification ratio.

2131 Mechanics of Applying Electric Motors. W. R. Harris. *Machine Design*, v. 29, Nov. 28, 1957, p. 109-115.

A review of the mechanics of motor application. Work and power; torque and acceleration time; transfer of inertia between shafts; equivalent inertia of bodies in translation; use of stored energy; mechanical time constant; acceleration losses in slip-type devices.

2132* (German.) Aluminum and Copper in Overhead Lines. **Aluminium und Kupfer im Freileitungsbau.** H. Mors. *Metall*, v. 11, Nov. 1957, p. 949-954.

Comparison between Al and Cu in their applications in line construction; advantages of Al as regard electrical conductivity, specific weight, mechanical strength. High, medium, and low voltage applications. Safety considerations.

2133 Instrument and Electrical Standard Practices for MTR and ETR. L. H. Jones. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-16395, Aug. 1957, 54 p. (UF767 Un3.1id Contin.)

A guide for the instrument engineer responsible for design of experiment instrumentation.

2134 Conductivity of Superconducting Films for Photon Energies Between 0.3 and 40 kT$_c$. R. E. Glover and M. Tinkham. *Physical Review*, v. 108, ser. 2, Oct. 15, 1957, p. 243-256.

Infra-red and mm. microwave transmission through thin superconducting Pb and Sn films.

2135* Evaluation of Modified Silicone Insulation Systems in Motors. G. A. Mullen and H. R. Sheppard. *Power Apparatus and Systems*, 1957, no. 32, Oct., p. 668-671.

Life at 130 C of systems incorporating modified-silicone wire enamels in otherwise class B systems is equivalent or superior to that of conventional class B systems. Conventional class H insulation systems are superior to silicone systems.

2136* A High-Power-Factor One - Running - Capacitor 2-Motor System. S. S. L. Chang. *Power Apparatus and Systems*, 1957, no. 32, Oct., p. 720-724.

Theory and test results of a proposed system which operates one phase of the fan motor in series with the running capacitor of the compressor motor in an air-conditioning unit.

2137* An Appraisal of Remote and Local Back-Up Relaying. L. F. Kennedy and A. J. McConnell. *Power Apparatus and Systems*, 1957, no. 32, Oct., p. 735-747.

A local back-up system using an entirely separate group of relays from that used for first-line protection, will meet all functional requirements for back-up protection.

2138* The Calculation of the Temperature Rise and Load Capability of Cable Systems. J. H. Neher and M. H. McGrath. *Power Apparatus and Systems*, 1957, no. 32, Oct., p. 752-772.

2139 Symposium on Corona, Nov. 1955. 32 p. 1957. American Society for Testing Materials, Philadelphia. (QC643 Am35s)

Effects of corona on thermosetting plastic laminates. Corrosion resistance test method for laminates, molded, and cast materials, pulse method for measuring ionization. Corona detection and measurement at 60 cycles. Measuring energy in a gas discharge.

2140* (Polish.) High Altitude Carbon Brush Problem. **Zagadnienie szczotek do wysokościowych maszyn elektrycznych.** Kwiryn Zuchowicz. *Technika Lotnicza*, v. 12, no. 5, Sept.-Oct. 1957, p. 134-138.

Apparatus measuring the use of carbon brushes at high altitudes. Effects of the pressure of O and water vapor and of the average temperature of the brushes on friction coefficient. Protective layer in saturated brushes. Their use at different heights in various amounts of moisture.

2141* (Russian.) The Silicon Solar Battery as a Source of Energy for Artificial Satellites. **Kremnievye solnechnye batarei kak istochniki elektricheskogo pitaniia iskusstvennykh sputnikov zemli.** V. S. Vavilov, V. M. Malovetskaia, G. N. Galkin, and A. P. Landsman. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 1a, Sept. 1957, p. 123-129.

Description of the construction of the battery and a study of the conditions of its successful performance.

2142* (Russian.) Calculation of Stability of Electric Systems Automatically Controlled by Computers. **Raschet ustoichivosti elektricheskikh sistem avtomaticheskogo regulirovaniia pri pomoshchi tsifrovykh vychislitel'nykh mashin.** B. M. Kagan. *Vestnik Elektropromyshlennosti*, v. 28, no. 10, Oct. 1957, p. 2-9.

Method of calculation by the M-3 computer. Calculation of stability regions and lines of equal degrees of stability.

2143* (German.) The Absorption of Electromagnetic Waves in Absorbers and Conductors With Homogeneous Conductance Coverage in Phases. **Die Absorption Elektromagnetischer Wellen in Absorbern und Leitungen mit abschnittweise homogenem Leitwertsbelag.** Karl-Ludwig Lenz and Otto Zinke. *Zeitschrift für Angewandte Physik*, v. 9, no. 10, Oct. 1957, p. 481-489.

Possible attenuation methods of homogeneous damped lines and absorbers. Analogy between a free field and a conductor. Characteristics of a line with voltage attenuation. Resistance transformation. Input resistance of lines of fixed length.

2144* (German.) The Dielectric Relaxation of Polar Fluids. **Zur dielektrischen Relaxation polarer Flüssigkeiten.** Rolf Schröder. *Zeitschrift für Naturforschung*, v. 12a, Sept. 1957, p. 731-735.

The course of dielectric constants of bromonaphthalene in CCl_4 was measured for four concentrations (1, 5, 10, and 20 wt.%) within a wave-length range of 1 to 35 cm.

2145* (Russian.) On the Phenomenological Theory of Electrets. **K voprosu o fenomenologicheskoi teorii elektretov.** A. N. Gubkin. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 9, Sept. 1957, p. 1954-1968.

A generalization of Adam's and Swann's theories for the case of short circuited electrets.

2146* (Russian.) Electrical Properties of Some Single Crystal and Polycrystalline Ferrites. **Elektricheskie svoistva nekotorykh monokristallov i polikristallicheskikh ferritov.** V. A. Ioffe, G. I. Khvostenko, and Z. N. Zonn. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 9, Sept. 1957, p. 1985-1995.

Temperature dependence of specific resistance, specific inductive capacitance, and dielectrical loss angle at the sonic frequency of solid solution systems of Ni, Zn, Mg, and Mn ferrites.

2147* (Russian.) The Breakdown of Insulating Liquids at the Limitation of Current in the Discharge Channel. **Proboi izoliruiushchikh zhidkostei pri ogranichenii toka v razriadnom kanale.** I. E. Balygin. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 10, Oct. 1957, p. 2291-2302.

Processes associated with sparking temperature and dynamics of the discharge after completion of initial breakdown of insulating liquids such as xylene, castor oil, transformer oil, and pentachlor-diphenyl.

2148* (Russian.) On Selection of Form of the Sample for Testing Ceramic Capacitor Materials for Breakdown. **K voprosu o vybore formy obraztsa dlia ispytaniia keramicheskikh kondensatornykh materialov na proboi.** K. E. Medvedev. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 10, Oct. 1957, p. 2410-2420.

Construction of a new type of specimen for determining dielectric strength. Recommendations for construction of new high-voltage ceramic capacitors.

See also: **2194** (corona discharge on high-voltage lines); **2352** (electric drives for rotary printing); **2353** (high-speed photography in electrical engineering); **2884** (electrical maintenance organization); **3048** (properties of paper pulp in capacitor paper).

ELECTROCHEMISTRY

2149* (English.) **Electroorganic Preparations. III. Polarography and Reduction of N-Nitrosamines.** Henning Lund. *Acta Chemica Scandinavica*, v. 11, no. 6, 1957, p. 990-996.

Polarographic reduction of the N-nitrosamines is shown by controlled potential electrolysis to be, in acid solution, a four electron reduction to the hydrazine, whereas the reduction in alkaline solution is a two electron reduction to the secondary amine with the formation of nitrous oxide.

2150* (German.) A Study of the Potential Oscillations in Iron and Zinc Electrodes in Sulfuric Acid. **Ein Beitrag zur Potentialschwingungen an Eisen- und Zinkelektroden in Schwefelsäure.** *Archiv für das Eisenhüttenwesen*, v. 28, Oct. 1957, p. 625-632.

Structure of the surface layer of the metal, and production of the oscillations. Application of the theory of Kipp oscillations and analogy with the glow lamp resonant circuit. Oscillations and stability compared with the curves found. Charge density and pressure curve.

2151 Voltaic Cells in Fused Salts. II. The Systems: (a) Silver-Silver Chloride, Lead-Lead Chloride; (b) Silver-Silver Chloride, Zinc-Zinc Chloride; and (c) Silver-Silver Chloride, Nickel-Nickelous Chloride. S. N. Flengas and T. R. Ingraham. *Canadian Journal of Chemistry*, v. 35, Nov. 1957, p. 1254-1259.

2152* (French.) Preparation of Zirconium and Zirconium Alloys by Igneous Electrolysis. **Sur la préparation du zirconium et de quelques alliages de zirconium par électrolyse ignée.** Jean-Lucien Andrieux and Jeanne Dauphin. *Comptes Rendus*, v. 245, no. 17, Oct. 21, 1957, p. 1359-1362.

Preparing Zr by electrolysis of $ZrCl_4$ dissolved in mixtures such as $CaCl_2$-NaCl or $CaCl_2$-KCl, at 600-700 C in an argon atmosphere, and Zr alloys with Be, Mn, Al, U, Ti by electrolysis of metallic halides dissolved in NaCl.

2153* (Russian.) Electrolytic Deposition of Lead-Nickel Alloy From Chloride-Fluoride Solutions. **Elektroliticheskoe osazhdenie splava olovo-nikel' iz khlorid-ftoridnykh rastvorov.** K. M. Tiutina and N. T. Kudriavtsev. *Doklady Akademii Nauk SSSR*, v. 115, no. 3, July 21, 1957, p. 580-582.

Method of depositing Pb-Ni alloy containing up to 65% Pb. Composition of the alloy. Its corrosion-resistant properties.

2154* (Russian.) Anodic Solution of Thorium in Fused Salts. **Anodnoe rastvorenie toriia v solevykh rasplavakh.** L. D. Iushina and M. V. Smirnov. *Doklady Akademii Nauk SSSR*, v. 115, no. 5, Aug. 11, 1957, p. 949-952.

During electrolysis of mixed fused chlorides with metallic thorium only Th^{2+} ions are transferred into the electrolyte. In the case of melted $ThCl_4$ at low current density (0.1 a/cm^2), the reaction of reduction is suppressed: $Th + ThCl_4 \leftrightarrows 2ThCl_2$.

2155 Transistor-Grade Silicon. I. The Preparation of Ultrapure Silicon Tetraiodide. Bernard Rubin, Guy H. Moates, and Joseph R. Weiner. *Electrochemical Society, Journal*, v. 104, Nov. 1957, p. 656-660.

Stepwise method of preparing and purifying SiI_4 involves direct combination of the elements, recrystallization of the product, followed by sublimation and zone purification steps. Some impurity elements can be removed to concentrations of less than one part impurity per billion parts of SiI_4 in sixty passes for a 50 cm. length charge.

2156 Electrolytic Reduction of 2-Amino-4-Chloropyrimidine, 2-Amino-4-Chloro-6-Methylpyrimidine, and 2-Aminopyrimidine. Kiichiro Sugino, Kozo Shirai, Taro Sekine, and Keijiro Odo. *Electrochemical Society, Journal*, v. 104, Nov. 1957, p. 667-672.

2157 Preparation of Feed Materials for Electrolytic Production of Thorium Metal. Charles E. Fisher and James L. Wyatt. *Electrochemical Society, Journal*, v. 104, Nov. 1957, p. 672-677.

Thorium nitrate was converted to $ThCl_4$ by aqueous chemical and thermal decomposition techniques; intermediate steps include the formation of an ammonium complex which may be dehydrated. The pilot and development programs are summarized.

2158 The Composition of Copper Complexes in Cuprocyanide Solutions. H. P. Rothbaum. *Electrochemical Society, Journal*, v. 104, Nov. 1957, p. 682-686.

Measurements of the static potential of Cu in a range of cuprocyanide solutions indicate that substantially all the Cu is in the form of $Cu(CN)_4$ ions as long as sufficient cyanide is present.

2159 Hydrogen Overpotential on Electrodeposited Ni in NaOH Solutions. I. A. Ammar and S. A. Awad. *Electrochemical Society, Journal*, v. 104, Nov. 1957, p. 686-690.

2160 Electroplating From the Pyrophosphate Bath. I. Electrodeposition of Single Metals. T. L. Rama Char. *Electroplating and Metal Finishing*, v. 10, Nov. 1957, p. 347-349.

Optimum operating conditions were established for Sn, Cu, Zn, Ni, and Pb.

2161 The Cathode Polarization Potential of Silver in Silver Nitrate. II. The Effect of *p*H on Solutions Containing Amino-Acetic Acid. III. Polarization Phenomena During Deposition on Single Crystals. E. G. Neal and L. L. Shreir. *Faraday Society, Transactions*, v. 53, Oct. 1957, p. 1371-1379.

2162* Recent Developments in Copper Plating. D. E. Weimer. *Institute of Metal Finishing, Bulletin*, v. 7, Autumn 1957, p. 13-24.

Problems of cyanide copper and acid sulfate copper electrodeposition. Pyrophosphate plating solution.

2163 Electrolytic Preparation of Thorium Metal. B. C. Raynes, J. C. Bleiweiss, M. E. Sibert, and M. A. Steinberg. *Journal of Metals*, v. 9, sec. 1; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Oct. 1957, p. 1373-1380.

Thorium chloride dissolved in molten NaCl can be electrolyzed in a continuous process for the production of granular, high purity Th metal powder. The preparation of anhydrous chloride, its electrolysis in an expanded scale cell, and the purity and some mechanical properties of the product Th are described.

2164 Preparation of Uranium Metal by Fused Salt Electrolysis. G. Meister and W. C. Lilliendahl. *Journal of Metals*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Nov. 1957, p. 1445-1447.

Uranium metal with a purity of about 99.9% was produced on a large scale by fused salt electrolysis with a material efficiency of about 90%. The material efficiency depends mainly on bath composition, electrolysis temperature, electrode smothering, and elutriation during washing of the powder.

2165 Electrical Conductivity of Fused Sodium Chloride-Calcium Chloride Mixtures. Joseph B. Story and John T. Clarke. *Journal of Metals*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Nov. 1957, p. 1449-1454.

A modification of the Kelvin bridge with an inductor was used to measure the conductivities. A capillary-type four-lead fused quartz dipping cell was constructed. The effect of a small amount of KCl on the conductivity of the melt was determined.

2166 Titanium Plating—Where It Stands Today. M. E. Sibert and M. A. Steinberg. *Materials in Design Engineering*, v. 46, Nov. 1957, p. 132-133.

Properties of coatings offering unusual corrosion protection; summary of promising plating processes.

2167* (German.) Optimum Electropolishing Conditions and Progress in the Investigation of New Baths. **Kontrolle der optimalen Elektropolierbedingungen und einige Fortschritte bei der Erforschung neuer Bäder.** E. Epelboin. *Metalloberfläche*, v. 11, Nov. 1957, p. 345-349.

Control of the polishing process during electrolysis. Determining the frequency of the a.c. Satisfactory bath concentration. Three new baths.

2168 How Corrosion Is Reduced on Landing Gear Pistons. William L. Aves, Jr. *Plating*, v. 44, Nov. 1957, p. 1175-1179.

Application of Zn, Cu, Ni, and Cr deposits to Al alloy pistons.

2169 Lead-Tin Alloy Plating for Aircraft Engine Components. Joseph Azzolino. *Plating*, v. 44, Nov. 1957, p. 1180-1182.

Control; procedures; factors influencing Sn content of deposit.

2170 Practical Aspects of Aluminum Hardcoating. A. W. Sweet. *Plating*, v. 44, Nov. 1957, p. 1191-1196.

Characteristics and structure of the hardcoats; equipment and processing details; finished hardcoated parts.

2171* Barrel Silver Plating. I. J. Warwick. *Product Finishing*, v. 10, Oct. 1957, p. 61-65.

Chief applications; barrel plating requirements; types of barrel; plating procedure.

2172 Electrochemistry and the Plater. II. Fred G. Brune. *Products Finishing*, v. 22, Nov. 1957, p. 68 + 4 pages.

The quantity of energy carried by the plating solution depends on the charge carried by the ion, the velocity at which the ion moves, and the number of ions in the solution.

2173* (Russian.) The Effect of Substances Containing Bivalent Sulfur on Nickel Plating. **O vliianii veshchestv, soderzhashchikh dvukhvalentnuiu seru, na protsess nikelirovaniia.** A. V. Pamfilov and P. M. Morgart. *Ukrainskii Khimicheskii Zhurnal*, v. 23, no. 5, 1957, p. 684-688.

Relation between bivalent S and the gloss of Ni-plated articles.

2174 Formation Fields and Current Efficiencies in the Anodic Oxidation of Zirconium. A Direct Comparison of High-Potential Formation Fields With Those Derived From Low-Potential Charging Curves. George B. Adams, Jr., Tien-Shuey Lee, and Pierre Van Bysselberghe. *University of Oregon (U. S. Atomic Energy Commission)*, AECU-3500, 1957, 33 p. (UF767 Un3au Contin.)

Formation fields at selected constant currents were obtained from high-potential unitary formation rates and polarographic current efficiency measurements carried out over the potential range 20-130 v.

2175* (Russian.) Restoration of Heavy-Duty Parts. **Vosstanovlenie krupnykh detalei.** I. E. Popovskii. *Vestnik Mashinostroeniia*, v. 37, no. 10, Oct. 1957, p. 70-71.

The traveling bath as a time-saving device for chrome-plating heavy machine parts.

2176* (German.) Experimental Investigations of the Slowing Down of the Relaxation of Electrokinetic Effects. **Experimentelle Untersuchungen zur Relaxationsbremsung elektrokinetischer Bewegungen.** M. von Stackelberg, H. Heindze, F. Wilke, and R. Doppelfeld. *Zeitschrift für Elektrochemie*, v. 61, no. 7, 1957, p. 781-789.

Determination of the electrophoretic effect as a function of the radius (1 to 20μ) and the electrolytic concentration (10^{-5} to 10^{-2}n) of a drop of paraffin oil in aqueous KCl solutions. Retardation of relaxation in a roughened glass plate during electro-osmosis.

2177* (German.) Galvanostatic Explanation of Electrode Reactions by Means of U_h $(t)_j$ Charging Curves Wtih an Intermittent Charge. **Galvanostatische Aufklärung von Elektrodenreaktionen durch Ladekurven $U_h(t)_j$ mit intermittierter Belastung.** K. Nagel, R. Ohse, and E. Lange. *Zeitschrift für Elektrochemie*, v. 61, no. 7, 1957, p. 795-803.

Description of measuring equipment for the intermittent galvanoplastic charging of a test electrode. The reference stress is oscillographically recorded and $U_h(t)_j$ curves are plotted. Application to the system Ag/KOH solution and Pb/H_2SO_4.

2178* (Russian.) The Influence of Certain Substances Added to Electrolyte on the Cathode Temperature Effect and Polarization in the Case of Electrodeposition of Cadmium Powder. **Vliianie dobavok na temperaturnyi effekt na katode i na katodnuiu poliarizatsiiu pri elektroosazhdenii poroshkoobraznogo kadmiia.** D. N. Gritsan and A. M. Bulgakova. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 9, Sept. 1957, p. 1943-1948.

2179* (Russian.) Adsorption Phenomena and Cathodic Processes Involved in the Electrodeposition of Iron Both in Compact Form and as a Powder. **Adsorbtsionnye iavleniia i katodnye protsessy pri elektroosazhdenii zheleza v kompaktnoi i poroshkoobraznoi forme.** A. I. Levin and S. A. Pushkareva. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 9, Sept. 1957, p. 1983-1991.

Investigates the polarization curves at a constant potential simultaneously determining the current efficiency.

2180* (Russian.) The Effect of Electrolyte Temperature on the Oxide Film Thickness and the Duration of Anodizing of Aluminum and Its Alloys. **Vliianie temperatury elektrolita na tolshchinu okisnykh plenok i prodolzhitelnost' anodirovaniia aliuminiia i ego splavov.** I. M. Plotnikov. *Zhurnal Prikladnoi Khimii*, v. 30, no. 9, Sept. 1957, p. 1321-1325.

Determining the correct relation between the anodizing process and the electrolyte temperature which would give a good protective film in the temperature range from 15 to 30 C.

See also: **2065** (electroplating of technical ceramics); **2080** (electroplating on Mo); **2125** (electrolytic films on Al and Ta); **2528** (anodic coating on Al wire); **2572** (metal finishing guidebook); **2634** (properties of Cr-plated steel).

ELECTRONICS

2181 Field Displacement Isolator in Microwave Communications. S. Weisbaum and H. Boyet. *Bell Laboratories Record*, v. 35, Nov. 1957, p. 456-461.

Ferrite slabs in the form of field displacement isolators can be used to eliminate adverse transmission effects due to reflection of microwave energy from discontinuities in radio-relay system equipment, without seriously reducing the strength of the transmitted signal.

2182 (German.) Electric Back-Reflection Process Without Pulse (CW-Radar). **Impulsfreie elektrische Rückstrahlverfahren (CW-Radar).** Friedrich von Rautenfeld. 216 p. 1957. Deutsche Radar-Verlagsgesellschaft mbH, Garmisch-Partenkirchen, Germany. (TK6575 R19i)

Survey of German investigations and accomplishments in the field of pulse-free reflection methods and radio direction finding.

2183* Reliability and the Component Engineer. Robert W. Brown. *Electrical Manufacturing*, v. 60, Nov. 1957, p. 126 + 5 pages.

Role of the component engineering specialist in providing applications engineering data to the circuit designer and packaging specialist. Examples show how a component engineering group may analyze electronic part failures to improve reliability through more realistic parts selection, testing, and application.

2184* Nuclear Shielding Materials for Electronic Circuits. John R. Hendrickson, Sr. *Electrical Manufacturing*, v. 60, Nov. 1957, p. 130-134.

Mechanism of nuclear radiation effects; pertinent properties of shielding materials; specific shield design considerations.

2185 A Design Method for Wide Band Balanced and Screened Transformers in the Range 0.1 - 200 Mc/s. M. M. Maddox and J. D. Storer. *Electronic Engineering*, v. 29, Nov. 1957, p. 524-531.

2186 Applications of a New Type of Cold Cathode Trigger Tube. II. G. O. Crowther and K. F. Gimson. *Electronic Engineering*, v. 29, Nov. 1957, p. 536-545.

Basic circuits; timing circuits; protection and overload circuits; simple servo systems and voltage regulators. (To be continued.)

2187 Simplified Pulse Transformer Design. J. H. Smith. *Electronic Engineering*, v. 29, Nov. 1957, p. 551-555.

Design of low-power pulse transformers and materials used; high power types and the relevant parameters; the Multiar transformer with a circuit description. A parameter for core selection in video or audio power transformers is derived.

2188 Systematic Design of Transistor Bias Circuits. Ray P. Murray. *Electronic Industries & Tele-Tech*, v. 16, Nov. 1957, p. 75 + 4 pages.

Establishing the operating point of the transistor and stabilizing it against temperature variations and replacement is simplified by these design formulas for bias components.

2189 Microwave High-Power Simulator. Harold Heins. *Electronic Industries & Tele-Tech*, v. 16, Nov. 1957, p. 78 + 4 pages.

By periodically injecting energy from a directional coupler into a waveguide cavity made in the form of a closed loop, much higher power levels can be achieved than are available from microwave power generators. Energy is stored in a circulating or traveling wave.

2190 Semiconductor Compounds Open New Horizons. Abraham Coblenz. *Electronics*, v. 30, Nov. 1, 1957, p. 144-149.

Comprehensive survey of 65 intermetallic and dye semiconducting compounds distinguishes these materials from conventional semiconductors and discusses their characteristics, unusual properties, and applications.

2191 Tones Monitor Heart's Electrical Action. Albert J. Morris and Joseph P. Swanson. *Electronics*, v. 30, Nov. 1, 1957, p. 160-162.

Frequency of neon-tube oscillator is controlled by amplitude of heart's electrical signal. Resulting tone series gives surgical team a constant check on heart. Explosion-proofed circuitry includes low-distortion differential preamplifier which discriminates against hum.

2192 Designing Tapered Waveguide Transitions. Bernard J. Migliaro. *Electronics*, v. 30, Nov. 1, 1957, p. 183-185.

A procedure for designing well-matched transitions between different waveguides where the guide wavelength varies along the taper. Simple graphical method employs data presented here for double-ridge-to-rectangular transitions. Procedure may also be used for rectangular-to-rectangular or ridge-to-ridge tapered transitions.

2193* (Russian.) Transmission of Signals by Modulated Noise. **Peredacha signalov modulirovannym shumom.** A. A. Kharkevich. *Elektrosviaz'*, v. 11, no. 11, Nov. 1957, p. 42-46.

2194* (German.) Radio Interference Caused by Corona Discharges on High Voltage Lines. **Funkstörungen durch Korona-Entladungen auf Hochspannungsleitungen.** Walter Wechsung. *ETZ, Elektrotechnische Zeitschrift*, v. 9, Ausgabe B, no. 10, Oct. 1957, p. 385-388.

Formation of the discharges. Interference frequency spectrum of a corona discharge. Determining factors of the intensity of a H.F. interference field. Distribution of the interference energy. Measuring methods and apparatus. Conversion curves for irregular measuring frequencies.

2195* (German.) Transmission Between Any Two Antennas. A Compilation of Formulas. **Die Übertragung zwischen beliebigen Antennen. Eine Zusammenstellung der Formeln.** K. Baur. *Frequenz*, v. 11, Oct. 1957, p. 308-312.

A time-saving grouping of formulas describing the interaction of antennas in electromagnetic fields. Antennas and fields of elliptical polarization.

2196 Future Circuit Aspects of Solid-State Phenomena. Edward W. Herold. *I. R. E., Proceedings*, v. 45, Nov. 1957, p. 1463-1474.

Superconductivity, molecular amplification, magnetic effects in semiconductors, and nonlinear capacitance in junctions. The potential advantages of controlled inhomogeneity in all types of solid-state devices.

2197 High-Frequency Semiconductor Spacistor Tetrodes. H. Statz, R. A. Pucel, and C. Lanza. *I. R. E., Proceedings*, v. 45, Nov. 1957, p. 1475-1483.

Objective is to achieve a good H.F. response by using processes which are localized in the high-field region of reverse-biased *p-n* junctions.

2198 A New Technique in Ferrite Phase Shifting for Beam Scanning of Microwave Antennas. F. Reggia and E. G. Spencer. *I. R. E., Proceedings*, v. 45, Nov. 1957, p. 1510-1517.

Reciprocal ferrite phase shifter for 3-cm. wavelength makes use of a new design technique for obtaining large phase changes per unit length by electrical means.

2199 Biperiodic Electrostatic Focusing for High-Density Electron Beams. Kern K. N. Chang. *I. R. E., Proceedings*, v. 45, Nov. 1957, p. 1522-1527.

A focusing scheme employing two counteracting periodic fields without the use of any magnet is shown to be superior to schemes which involve only one periodic focusing field.

2200 Theory of a Wide-Gap Emitter for Transistors. Herbert Kroemer. *I. R. E., Proceedings*, v. 45, Nov. 1957, p. 1535-1537.

A significant increase in the performance capabilities of transistors is possible by using an emitter material with a higher energy-band gap than the base material.

2201 Shot Noise in Transistors. G. H. Hanson and A. van der Ziel. *I. R. E., Proceedings*, v. 45, Nov. 1957, p. 1538-1542.

Characteristics of the noise current generator were established by measurements of output equivalent saturated diode current made with the input open.

2202 The "Stereosonic" Recording and Reproducing System. H. A. M. Clark, G. F. Dutton, and P. B. Vanderlyn. *Institute of Radio Engineers, Transactions on Audio*, v. AU-5, July-Aug. 1957, p. 96-111. (TK1 In6.6au Vis.)

Importance of stereophony in sound reproduction; history; comparison of basic systems; theory of the "steresonic" system; equipment used in the making of master recordings and some of the problems of studio technique involved.

2203 The Traveling-Wave VHF Television Transmitting Antenna. Matti S. Siukola. *Institute of Radio Engineers, Transactions on Broadcast and Television Receivers*, v. BTR-3, Oct. 1957, p. 49-58. (TK1 In6.6b Vis.)

Antenna utilizes pairs of slot radiators cut longitudinally in a vertical pipe.

2204 A New Approach to Horizontal Deflection Tube Testing. Gerald M. Lankard. *Institute of Radio Engineers, Transactions on Broadcast and Television Receivers*, v. BTR-3, Oct. 1957, p. 94-97. (TK1 In6.6b Vis.)

Suggests a desirable test method to drive the horizontal deflection tube with a square-wave signal, thus permitting the measurement of such parameters as peak currents. Ib-to-Ic2 ratio, and voltage at the knee of the plate characteristic.

2205 A Variable-Ratio Microwave Power Divider and Multiplexer. W. L. Teeter and K. R. Bushore. *Institute of Radio Engineers, Transactions on Microwave Theory and Techniques*, v. MTT-5, Oct. 1957, p. 227-229. (TK1 In6.6mt Vis.)

Theory and operation of a microwave power divider which can be adjusted so that power is divided between two outputs in any desired ratio. Used conversely the device has other applications, such as coupling two frequencies into one output.

2206 High-Power Ferrite Circulators. Peter A. Rizzi. *Institute of Radio Engineers, Transactions on Microwave Theory and Techniques*, v. MTT-5, Oct. 1957, p. 230-237. (TK1 In6.6mt Vis.)

The insertion loss and Faraday rotation for various ferrite configurations were studied by use of a system capable of measuring microwave loss to wthin ± 0.05 db. By defining both a power handling and transmission figure of merit, a ferrite structure capable of handling large amounts of microwave power was chosen.

2207 Deflection of Waveguide Subjected to Internal Pressure. Lucien G. Virgile. *Institute of Radio Engineers, Transactions on Microwave Theory and Techniques*, v. MTT-5, Oct. 1957, p. 247-250. (TK1 In6.6mt Vis.)

The pressure carrying capacity of a large range of standard waveguide sizes can be readily determined by the use of formulas obtained by a continuous beam analogy. Techniques for designing a special high-strength lightweight guido are discussed, including the use of a honeycomb sandwich construction.

2208 The Calibration of Microwave Attenuators by an Absolute Method. Elizabeth Laverick. *Institute of Radio Engineers, Transactions on Microwave Theory and Techniques*, v. MTT-5, Oct. 1957, p. 250-254. (TK1 In6.6mt Vis.)

2209 Pulse Waveform Degradation Due to Dispersion in Waveguide. Robert S. Elliott. *Institute of Radio Engineers, Transactions on Microwave Theory and Techniques*, v. MTT-5, Oct. 1957, p. 254-257. (TK1 In6.6mt Vis.)

By assuming that phase velocity in a waveguide is a quadratic function of frequency, it is possible to derive a compact formula for pulse degradation due to dispersion. From the formula a family of universal curves can be computed, showing the effect of guide length, pulse width, and dispersion on the pulse shape.

2210 Coherent Spontaneous Microwave Emission by Pulsed Resonance Excitation. L. E. Norton. *Institute of Radio Engineers, Transactions on Microwave Theory and Techniques*, v. MTT-5, Oct. 1957, p. 262-265. (TK1 In6.6mt Vis.)

An investigation of the coherent microwave emission from pulse-excited NH_3 molecules.

2211 Passive Components for Submarine Telephone Cable Repeaters. M. C. Wooley. *Institute of Radio Engineers, Transactions on Reliability and Quality Control*, PGRQC-12, Nov. 1957, p. 14-24. (TK1 In6.6q Vis.)

Reliability problems in the design of capacitors, inductors, resistors, and transformers.

2212* How to Increase Tube Life in Electronic Instruments. R. F. Mahood. *ISA Journal*, v. 4, Nov. 1957, p. 502-506.

Select reliable equipment; select long life tubes; stabilize your tubes; replace tubes before they fail.

2213 Preparation of Large-Area *p-n* Junctions in Silicon by Surface Melting. E. Billig and D. B. Gasson. *Journal of Applied Physics*, v. 28, Nov. 1957, p. 1242-1245.

In one method direct rf power coupling is used to form a cylindrical *p-n* junction in a rod of Si. Also, radiation heating is used to melt the surface of thin disks of Si.

2214 Surface Studies on Single-Crystal Germanium. S. G. Ellis. *Journal of Applied Physics*, v. 28, Nov. 1957, p. 1262-1269.

Chemical, electron microscope, electron diffraction and photoconductor studies on Ge, aimed at clarifying the state of oxidation of Ge crystals after various etching treatments.

2215 Semiconductor Properties of Recrystallized Silicon in Aluminum Alloy Junction Diodes. Richard A. Gudmundsen and J. Maserjian, Jr. *Journal of Applied Physics*, v. 28, Nov. 1957, p. 1308-1316.

2216 High-Speed Microwave Switching of Semiconductors. R. V. Garver, E. G. Spencer, and R. C. LeCraw. *Journal of Applied Physics*, v. 28, Nov. 1957, p. 1336-1338.

The use of *n*-type Ge diodes in obtaining exceptionally high-speed, high-repetition-rate microwave switching is demonstrated.

2217* Semiconductor Lifetime as a Function of Recombination State Density. D. H. Clarke. *Journal of Electronics and Control*, v. 3, no. 4, Oct. 1957, p. 375-386.

Analysis of the Shockley-Read model is extended to describe the transient behavior. Relation between steady state and transient measurements of photoconductivity is examined.

2218* Cooling of Hot Electrons by Acoustic Scattering in Degenerate Semiconductors. R. F. Greene. *Journal of Electronics and Control*, v. 3, no. 4, Oct. 1957, p. 387-390.

Shockley's calculation of the energy loss rate of hot electrons by acoustic scattering in semiconductors is extended to include the case of degenerate electron statistics.

2219* The Effect of Heat Treatment on the Bulk Lifetime of Excess Charge Carriers in Silicon. L. M. Nijland and L. J. Van der Pauw. *Journal of Electronics and Control*, v. 3, no. 4, Oct. 1957, p. 391-395.

Bulk lifetime both in p- and n-type crystals made by the floating zone method and of n-type crystals made by the Czochralski technique was increased by annealing at temperatures between about 300 and 700 C. Annealing above 700 C decreased lifetime.

2220* (French.) Internal Resistances and Capacity of a Selenium Photocell at Low Temperatures. **Résistances et capacité internes d'une photopile au sélénium aux basses températures.** G. Blet. *Journal de Physique et le Radium*, v. 18, no. 10, Oct. 1957, p. 572-578.

The variations of capacity of a photocell at low temperatures cause phenomena similar to those observed for variations of resistance. These quantities seem to be intimately associated and depend directly on the concentration of free electrons at a particular energy level.

2221* (Hungarian.) Investigatin of Some Characteristics of the GM Discharge. **A GM-kisülés egyes jellemzőinek vizsgálata.** József Koch. *Magyar Fizikai Folyóirat*, v. 5, no. 3, 1957, p. 207-216.

Current impulse of discharge in GM tubes with argon-ethyl alcohol filling. Calculation of current and rate of propagation of discharge on the basis of the form of the impulse.

2222* (German.) A Microwave Link System With Frequency Modulation for 120 Telephone Channels in the Frequency Band 1700 to 2300 Mc/s (FM 120/2000). **Ein Richtfunksystem mit Frequenzmodulation für 120 Fernsprechkanäle im Frequenzbereich von 1700 bis 2300 MHz (FM 120/2000).** H. Holzwarth, G. Bosse, C. Colani, and E. Seibt. *NTZ; Nachrichtentechnische Zeitschrift*, v. 10, no. 10, Oct. 1957, p. 485-493.

2223* (German.) Investigation of Joints in Wires Inside Cables for Local Networks. **Untersuchungen an Verbindungsstellen von Ortskabeladern.** J. Lennertz and H. Krath. *NTZ; Nachrichtentechnische Zeitschrift*, v. 10, no. 10, Oct. 1957, p. 502-507.

Twisted joints in 0.4 mm. O. D. wires inside cables for local networks have transition resistances which lie in the same order of magnitude as those in the previously used wires of 0.6 and 0.8 mm. O. D.

2224* Minimum Cost Decision-Feedback Systems for Detecting Signals Perturbed by Additive Gaussian Noise. B. Harris, A. Hauptschein, and L. S. Schwartz. *Operations Research Society of America, Journal*, v. 5, Oct. 1957, p. 680-692.

A uniform null, nontruncated system is optimum in the cost (transmission time) sense. This system is capable of reducing the probability of error to zero for infinitely large transmission time.

2225 Theory of Secondary Electron Emission by High-Speed Ions. E. J. Sternglass. *Physical Review*, v. 108, ser. 2, Oct. 1, 1957, p. 1-12.

Analysis is based on the formation of secondaries according to the Bohr-Bethe theory of ionization, diffusion of the slow secondaries to the surface, and their subsequent escape in the vacuum.

2226 Threshold Energy for Electron-Hole Pair-Production by Electrons in Silicon. A. G. Chynoweth and K. G. McKay. *Physical Review*, v. 108, ser. 2, Oct. 1, 1957, p. 29-34.

A value of 2.25 ± 0.10 e.v. was found. There is apparently a slight variation of the threshold energy with crystallographic direction; the directions [100], [110], [111], are listed in ascending order of threshold energies.

2227 Hall Effect Studies of Doped Zinc Oxide Single Crystals. A. R. Hutson. *Physical Review*, v. 108, ser. 2, Oct. 15, 1957, p. 222-230.

Measurements of Hall coefficient and electrical conductivity of single-crystal specimens of *n*-type ZnO at temperatures between 55 and 300 K.

2228 Copper-Doped Germanium as a Model for High-Resistivity Photoconductors. P. J. van Heerden. *Physical Review*, v. 108, ser. 2, Oct. 15, 1957, p. 230-238.

The nature of the electrodes plays an essential role in the behavior of Cu-doped Ge. The primary and secondary photocurrent can be sharply distinguished experimentally, and form the basic concept for an explanation of the photocurrent.

2229 Effect of Impurity Scattering on the Magnetoresistance of *n*-Type Germanium. Maurice Glicksman. *Physical Review*, v. 108, ser. 2, Oct. 15, 1957, p. 264-267.

Observations in *n*-type Ge show a decrease in the anisotropy of the magnetoresistance with increased ionized-impurity content and with decreased temperature. Deviations from the magnetoresistance symmetry conditions are observed for crystals with electron concentration $n > 4 \times 10^{15}$ cm^{-3} at 77 K.

2230 Infrared Absorption in *n*-Type Silicon. W. Spitzer and H. Y. Fan. *Physical Review*, v. 108, ser. 2, Oct. 15, 1957, p. 268-271.

Absorption by free carriers in *n*-type Si was studied in a spectral region from 1 to 45μ for samples of various impurity and carrier concentrations.

2231 Elastoresistance Effects in a Germanium-Silicon Alloy. Robert W. Keyes. *Physics and Chemistry of Solids*, v. 3, nos. 1-2, 1957, p. 102-106.

The large piezoresistance effect in a Ge 0-04 Si alloy was found to be proportional to T^{-1} between 77 and 300 K, and 15% greater than in pure Ge. At least part of the difference is due to intervalley scattering of the alloy type in the alloy.

2232* Evaluation of Operating Principles With Microwave Relaying. J. Berdy, H. J. Fiedler, F. C. Krings, and A. J. McConnell. *Power Apparatus and Systems*, 1957, no. 32, Oct., p. 674-686.

Basic pilot-relaying considerations, microwave - pilot - relaying schemes; relationship of reliability and security; methods of providing a tripping- or blocking-type channel; other channel considerations; relay factors; combination of relays and channel equipment.

2233* (Russian.) New Type Wide-Band Transformers. **Shirokopolosnye transformatory novogo tipa.** Iu. M. Lebedev-Krasin. *Radiotekhnika*, v. 12, no. 9, Sept. 1957, p. 38-46.

Design, operation, advantages, and applications.

2234* (Russian.) Single-Tube Methods of Quartz Frequency Dividing and Multiplication. **Odnolampovye skhemy deleniia i umnozheniia chastoty kvartsa.** G. M. Utkin. *Radiotekhnika*, v. 12, no. 9, Sept. 1957, p. 47-54.

Theoretical and experimental study.

2235* (Russian.) Analysis of Transistor Operational Properties in Non-Linear Circuits. **Ob issledovaniiakh osobennostei raboty poluprovodnikovykh triodov v nelineinykh skhemakh.** V. V. Migulin. *Radiotekhnika i Elektronika*, v. 2, no. 9, Sept. 1957, p. 1091-1096.

Study of a series of circuits using transistors. Survey of the properties of these circuits in comparison with those of circuits using electron tubes. Possibility of more general methods.

2236* (Russian.) Transient Characteristics of Junction Type Transistors. **Perekhodnye kharakteristiki ploskostnykh poluprovodnikovykh triodov.** Iu. M. Az'ian, K. S. Rzhevkin, and K. Ia. Senatorov. *Radiotekhnika i Elektronika*, v. 2, no. 9, Sept. 1957, p. 1097-1109.

Theoretical and experimental investigation of the non-stationary process of transistors during transmission of the electric signal. Current amplification of a small signal; application to the transient process in a large signal.

2237* (Russian.) Some Special Properties of Transistor Oscillators. **Nekotorye osobennosti avtogeneratorov na poluprovodnikovykh triodakh.** L. N. Kaptsov. *Radiotekhnika i Elektronika*, v. 2, no. 9, Sept. 1957, p. 1127-1137.

A study of the forms of currents and voltages in different circuits of a generator with almost harmonic vibrations in transistors. Limited application of the methods used in calculating the amplitude and process of oscillation for semiconductor generator.

2238* (Russian.) Correction of Transistor Amplifiers. **Korrektsiia usilitelei na poluprovodnikovykh triodakh.** K. S. Rzhevkin and E. S. Andrianov. *Radiotekhnika i Elektronika*, v. 2, no. 9, Sept. 1957, p. 1157-1169.

Analysis of the very simple circuit of a one-stage amplifier with a junction type transistor. Formulas for calculating correcting elements in two particular cases. Possibility of constructing wide-band amplifiers.

2239* (Russian.) Some Non-Linear Properties of Junction Transistors Related to Base Modulation. **Nekotorye nelineinye svoistva ploskostnykh triodov, sviazannye s moduliatsiei bazy.** Iu. M. Az'ian and A. A. Tikhonova. *Radiotekhnika i Elektronika*, v. 2, no. 9, Sept. 1957, p. 1174-1177.

Theoretical calculation of the current in the collector of a junction transistor. Effect of change of thickness on the base layer under the influence of an alternating voltage on the ohmic charge in the collector circuit.

2240* (Russian.) Dependence of Capacity and Resistance of Germanium Diodes on Frequency and the Positive Bias Current. **Zavisimost' emkosti i soprotivleniia splavnykh germanievykh diodov ot chastoty i toka polozhitel'nogo smeshcheniia.** N. A. Penin and K. V. Iakunina. *Radiotekhnika i Elektronika*, v. 2, no. 9, Sept. 1957, p. 1200-1209.

Correspondence between frequency properties of Ge diodes and the diffusion theory of the *p-n*-junction in the measurement of the charging capacity of a barrier layer.

2241 Receiving Aerial Systems for Broadcast and Television. I. A. Davidson. 152 p. 1957. Philosophical Library, New York. (TK6655.A6 D28r)

Design, construction, and installation. Measurement of aerial characteristics.

2242 The Influence of Interelectronic Collisions on Conduction and Breakdown in Covalent Semi-Conductors. R. Stratton. *Royal Society, Proceedings*, v. 242, ser. A, Nov. 5, 1957, p. 355-373.

2243* (German.) A Transistor Control Amplifier. **Ein Transistor-Regelverstärker.** Claus Kessler and Dieter Ströle. *Siemens Zeitschrift*, v. 31, nos. 10-11, Oct.-Nov. 1957, p. 502-504.

In connection with control installations for heavy current technique, a transistor-control amplifier was developed that, in the circuit of a symmetrical two-step zero-current amplifier of high voltage and current amplification, is especially appropriate for positive and negative feedbacks of high all-round amplification.

2244 The Breakdown of Cathode Coatings. Bernard Wolk. *Sylvania Technologist*, v. 10, Oct. 1957, p. 106-110.

Carbon dioxide pressure was measured as a function of time under standardized conditions of exhaust. Two pressure peaks are observed, and the temperatures at which they occur are related to such variables as carbonate particle size, structure of the carbonate particles, and density of the coating on the cathode.

2245* (Russian.) Electrical Properties of Germanium With an Admixture of Zinc. **Elektricheskie svoistva germaniia s primes'iu tsinka.** S. G. Kalashnikov, E. Iu. L'vova, and V. V. Ostroborodova. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 9, Sept. 1957, p. 1925-1930.

Effect of Zn admixtures on Hall mobility of holes and electrons, and rate of electron recombination.

2246* (Russian.) The Influence of Elements of Groups III and V on the Recombination Speed of Electrons and Holes in Germanium. **Vliianie elementov III i V grupp na skorost' rekombinatsii elektronov i dyrok v germanii.** V. G. Alekseeva, S. G. Kalashnikov, L. P. Kalnach, I. V. Karpova, and A. I. Morozov. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 9, Sept. 1957, p. 1931-1939.

The effect of Bi, Sb, Tl, and Ga on the rate of electron and hole recombination in Ge.

2247* (Russian.) On the Edge Breakdown of *p-n* Junctions in Germanium. **O kraevom proboe *p-n*-perekhodov v germanii.** B. M. Vul and A. P. Shotov. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 10, Oct. 1957, p. 2189-2194.

Measurement of breakdown voltage of diffused and melted-in $p+n$ and $n+p$ junctions in Ge in air and in atmospheres with increased specific inductive capacitance.

2248* (Russian.) Temperature Dependence of the Hall Coefficient in Semiconductors With Constant Concentration of Carriers. **Temperaturnaia zavisimost' koeffitsienta kholla v poluprovodnikakh s postoiannoi kontsentratsiei nositelei.** E. I. Kaplunova and K. B. Tolpygo. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 10, Oct. 1957, p. 2246-2251.

Determining several parameters of a semiconductor by determination of the temperature dependence of the Hall coefficient.

2249* (Russian.) Electronic Waves in Periodic Structures. **Elektronnye volny v periodicheskikh strukturakh.** L. A. Vainshtein. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 10, Oct. 1957, p. 2340-2352.

Studies by the excitation theory of periodic waveguides and a mathematical method of variations, which permits calculation of linear properties of a tube with traveling and backward waves.

See also: **1682** (the system $BaTiO_3$-$SrTiO_3$); **1972** (organic semiconductor); **2321** (geophysical electronics); **2329** (fading of radio signals); **2330** (distortion of radio waves in the ionosphere); **2361** (recording Xe flashlamp); **2391** (piezoresistive materials for displacement, force, and torque measurement); **2696** (testing wires for radio-tube grids); **2919** (heat conduction principles); **3038** (semiconductor cooling fins).

ENGINEERING ECONOMICS

2250 The Wise Use of Our Natural Resources. Clifford C. Furnas. *American Iron and Steel Institute, Preprint*, 1957, 15 p. (TS300 Am35ta Vis.)

Some remarks concerning utilization of raw materials by the iron and steel industry to best meet the world industrial challenge.

2251 Trends in the Chlor-Alkali Industry. Theodore Sheets, Jr. *Chemical Engineering Progress*, v. 53, Oct. 1957, p. 482-488.

Outlets for chlorine and caustic are analyzed as a basis for shaping future plans.

2252 The Economic Background for the Competitive Development of Nuclear Power. Harlan W. Nelson and W. R. Keagy, Jr. Paper from "Advances in Nuclear Engineering." v. I. Pergamon Press, 1957, p. 210-219. (TK9006 N88 Over.)

An analysis of the projected future demand for electric energy in the U.S., together with the factors of mineral fuel availability, reserves, distribution, and energy costs. Technical developments and expectations for the future in terms of costs and efficiencies of conventional thermal generating plants are discussed. Future expectations for nuclear power are examined against this background.

2253* (German.) The Atomic Power Plant in Electricity Production. **Das Atomkraftwerk in der Elektrizitätswirtscharft.** Oskar Vas. *Elektrotechnik und Maschinenbau*, v. 74, no. 20, Oct. 15, 1957, p. 453-466.

Today's demand for fuel and electric power will be satisfied by nuclear power applications only after about ten years. Now more fission material is produced than used. Energy production costs should be lowered first, and a technical solution of the nuclear fission problems found to make it practical.

2254 Economic Geography of Ohio. Alfred J. Wright. *Ohio Department of Natural Resources, Division of Geological Survey, Bulletin* 50, 2nd Rev. Ed., 1957, 245 p. (QE151 Oh3b Vis.)

The development of Ohio's major industries, including manufacturing, commerce, agriculture, and mineral. The evolutionary aspects of economic life in Ohio's five major geographic regions.

2255 (German.) Transport and Handling of Iron Ores for West German Steelworks. **Transport und Umschlag der Eisenerze für westdeutsche Hüttenwerke.** Adolf Pöhner. *Stahl und Eisen*, v. 77, no. 21, Oct. 17, 1957, p. 1417-1426.

Transportation problems of domestic and imported ores going to steel-making centers; present-day conditions and possible developments in the near future.

2256 (German.) The Factor Analysis Method of Cost Accounting Represented by the Example of an Open-Hearth Steel Plant. **Die Kosten-Einflussgrössenrechnung, dargestellt am Beispiel eines Siemens-Martin-Stahlwerkes.** Josef Hoffstadt. *Stahl und Eisen*, v. 77, no. 21, Oct. 17, 1957, p. 1488-1496.

Study of the accounting, its application and theory. Computation and representation of the cost equation.

2257 (Italian.) Statistics of Mines, Quarries, and Peat Beds for 1954. Production, Labor, Motive Power, Accidents, Trends of Research Permits, Existing Mines and Their Activity. **Statistica delle miniere, cave e torbiere per l'anno 1954. Produzione, manodopera, forza motrice, infortuni e movimento die permessi di ricerca, miniere esistenti e loro stato di attivita.** 159 p. 1957. Mines Section, Industry and Commerce Dept., Rome. (Tn79 It1.5s)

Tabular data on the activities of Italian mineral industries, including production of metallurgical and mineralogical laboratories in 1938, 1951, 1952, 1953, and 1954. Products from quarries by Italian provinces. Peat bed products. Accident records. Administrative measures. Mining concessions.

See also: **2466** (Cb and Ta production and consumption); **2467** (statistics on Co); **2491** (Ti materials survey).

FLUID MECHANICS

2258* Direct Shear Stresses and Air Velocity Profiles on a Mechanical Wave Boundary. G. H. Moore and A. D. K. Laird. *American Geophysical Union, Transactions*, v. 38, Oct. 1957, p. 681-687.

Shear stresses of air on a rubber-sheet mechanical model of standing waves, stationary waves, and flat surface were measured directly and calculated from velocity profiles. Shear stresses varied as the 1.64 power of the main stream velocity and were less for the standing than for the stationary waves. The roughness length parameter was independent of the position on the surface and of the main stream velocity.

2259* Heat Transfer to Subsaturated Water, Dry Air and Hydrogen in Turbulent Flow Inside a Tube. Irving Granet. *American Society of Naval Engineers, Journal*, v. 69, Nov. 1957, p. 787-795.

2260 Pressure Drop for Parallel Flow Through Rod Bundles. B. W. LeTourneau, R. E. Grimble, and J. E. Zerbe. *ASME, Transactions*, v. 79, Nov. 1957, p. 1751-1758.

Friction factors for flow parallel to a rod bundle were determined experimentally in a Reynolds-number range from approximately 5000 to 100,000. Entrance plus exit-loss coefficients, and joint loss coefficients between axially aligned rod bundles also were measured experimentally for tube-sheet end connections.

2261 Resistance Coefficients for Laminar and Turbulent Flow Through One-Half-Inch Valves and Fittings. C. P. Kittredge and D. S. Rowley. *ASME, Transactions*, v. 79, Nov. 1957, p. 1759-1766.

Apparatus and test procedures. Resistance coefficients as functions of Reynolds number.

2262 Skewed Boundary-Layer Flow Near the End Walls of a Compressor Cascade. R. W. Moore, Jr. and D. L. Richardson. *ASME, Transactions*, v. 79, Nov. 1957, p. 1789-1800.

Flow conditions similar to those near the hub of an axial-compressor rotor were produced in a stationary cascade of blades, and the results of extensive measurements of boundary-layer flow between the blades are presentd.

2263 An Investigation of the End-Wall Boundary Layer of a Turbine-Nozzle Cascade. J. R. Turner. *ASME, Transactions*, v. 79, Nov. 1957, p. 1801-1806.

The end-wall boundary-layer behavior inside the nozzle passage is essentially independent of the boundary layer entering the cascade; the low-energy fluid which appears in the suction-surface end-wall corner at cascade discharge has its origin only in the end-wall and suction-surface boundary layers.

2264 Computer Representations of Engineering Systems Involving Fluid Transients. F. D. Ezekiel and H. M. Paynter. *ASME, Transactions*, v. 79, Nov. 1957, p. 1840-1850.

2265* (French.) Determining the Velocity of a Perfect Incompressible Fluid as a Function of Its Rotational Flow. **Détermination de la vitesse d'un fluide parfait incompressible en fonction de son rotationnel.** Robert Legendre. *Comptes Rendus*, v. 245, no. 16, Oct. 14, 1957, p. 1296-1298.

The use of the functions of Green and Neumann to derive a mathematical expression for certain applications.

2266* (Russian.) Hypersonic Flow Past a Thin Cone With a Blunt Nose. **Obtekanie tonkogo zatuplennogo konusa pri bol'shoi sverkhzvukovoi skorosti.** G. G. Chernyi. *Doklady Akademii Nauk SSSR*, v. 115, no. 4, Aug. 1, 1957, p. 681-683.

Mathematical analysis.

2267* Rotational Flow of a Liquid Past a Regular Polygonal Cylinder. L. V. K. Viswanadha Sarma. *Indian Academy of Sciences, Proceedings*, v. 46, sec. A, Sept. 1957, p. 224-231.

The stream function for the rotational flow of liquid past a regular polygonal cylinder of n sides is obtained and the thrust on the cylinder due to liquid motion is calculated.

2268 Permeability Valves. Permeability of Gases and Vapors Through Composite Membranes. C. E. Rogers, Vivian Stannett, and Michael Szwarc. *Industrial and Engineering Chemistry*, v. 49, Nov. 1957, p. 1933-1936.

Systems exhibiting different permeabilities for different flow directions may be used as "valves" in special applications.

2269 Orifice Fittings and Meter Tubes. Ralph C. Clemons, Jr. *Instruments and Automation*, v. 30, pt. 1, Oct. 1957, p. 1900-1904.

Factory-fabricated orifice fittings and meter runs contribute to increased flexibility, serviceability, and accuracy.

2270* Definition and Significance of the Flow Coefficient in Accelerated Flow, With Special Reference to Metering Devices. T. H. Redding. *Journal of Electronics and Control*, v. 3, no. 4, Oct. 1957, p. 409-438.

2271 Low Reynolds Number Flow Past a Circular Cylinder. Saul Kaplun. *Journal of Mathematics and Mechanics*, v. 6, Sept. 1957, p. 595-603.

Mathematical analysis.

2272 On the Propagation and Decay of Spherical Blast Waves. T. Y. Thomas. *Journal of Mathematics and Mechanics*, v. 6, Sept. 1957, p. 607-619.

2273 Variation of Flow Quantities Along Streamlines and Their Principal Normals and Binormals in Three-Dimensional Gas Flows. R. P. Kanwal. *Journal of Mathematics and Mechanics*, v. 6, Sept. 1957, p. 621-628.

Deals with three-dimensional steady rotational gas flows of non-viscous and non-heat-conducting fluids, investigating various dynamical and kinematical relations connecting the flow quantities with the geometrical parameters of the streamline trajectories.

2274* Propagation of an Aperiodic Wave in a Compressible Viscous Medium. Meir Hanin. *Journal of Mathematics and Physics*, v. 36, Oct. 1957, p. 234-249.

Mathematical analysis.

2275* The Use of High-Speed Photography in the Study of Cavitation. I. S. Pearsall. *Journal of Photographic Science*, v. 5, Sept.-Oct. 1957, p. 105-111.

2276 The Leon Tube. An Instrument for Measuring Flow Speeds in Water. J. F. Kemp. *Journal of Scientific Instruments*, v. 34, Oct. 1957, p. 390-392.

Construction and performance characteristics of an instrument capable of measuring flow speeds at a point over a range of 1 to 14 ft/s.

2277* (English.) **Boundary Layer Growth of Open Channel Flows on a Smooth Bed and Its Contribution to Practical Application to Channel Design.** Yoshiaki Iwasa. *Kyoto University, Memoirs of the Faculty of Engineering*, v. 19, no. 3, July 1957, p. 229-254.

2278* (Russian.) Solution of Equations of Axis-Symmetrical Supersonic Gas Movement, Linearized Relative to the Gas Source. **Reshenie uravnenii osesimmetrichnogo sverkhzvukovogo dvizheniia gaza, linearizirovannykh otnositel'no techeniia ot gazovogo istochnika.** A. K. Poluboiarinov. *Leningradskogo Universiteta, Vestnik, Seriia Matematiki, Mekhaniki i Astronomii*, v. 12, no. 13, 1957, p. 102-112.

Method for linearization and solution of equations of symmetrical non-vertical gas movement.

2279* (Russian.) Unsteady Outflow of Gas From a Cylindrical Balloon. **Neustanovivshiisia protsess istecheniia gaza iz tsilindricheskogo ballona.** V. G. Dulov. *Leningradskogo Universiteta, Vestnik, Seriia Matematiki, Mekhaniki i Astronomii*, v. 12, no. 13, 1957, p. 132-145.

Investigates the changes of the gas parameters in a balloon at the time of gas outflow through an opening.

2280* (Russian.) Steady Turbulent Motion of Gas in Round Pipes. **Ustanovivsheesia turbulentnoe dvizhenie gaza v kruglykh trubakh.** E. E. Lemekhov. *Leningradskogo Universiteta, Vestnik, Seriia Matematiki, Mekhaniki i Astronomii*, v. 12, no. 13, 1957, p. 161-168.

Dependence of friction and heat conduction upon Reynolds and Prandtl numbers; temperature drop at cross-section of a pipe.

2281* (Hungarian.) Relativistic Hydrodynamics. **Relativisztikus hidrodinamika.** György Marx. *Magyar Fizikai Folyóirat*, v. 5, no. 2, 1957, p. 91-104.

Theoretical foundation of relativistic dynamics on the basis of the principle of variation. Potential flow and propagation of elastic waves. Laws of liquid flow under the effect of an electromagnetic field. Application of results to the physics of the nucleus and of elementary particles.

2282* (English.) **Viscous Flows Past a Spheroid.** Shōichi Wakiya. *Physical Society of Japan, Journal*, v. 12, no. 10, Oct. 1957, p. 1130-1141.

Considers flow past a spheroid between two parallel plane walls and in a cylindrical pipe.

2283* (Russian.) Calculation of Certain Sonic Gas Flows. **Raschet nekotorykh zvukovykh techenii gaza.** P. I. Chushkin. *Prikladnaia Matematika i Mekhanika*, v. 21, no. 3, May-June 1957, p. 353-360.

Mathematical calculation of the problem of sonic flow past the nose portion of ellipses and ellipsoids.

2284* (Russian.) Heat Convection in Rotating Round Tubes at Constant Temperature Gradient. **Teplovaia konvektsiia vo vrashchaiushcheisia krugloi trube pri postoiannom temperaturnom gradiente.** V. N. Golubenkov. *Prikladnaia Matematika i Mekhanika*, v. 21, no. 3, May-June 1957, p. 439-440.

Study of the convection in an artificial gravitational field.

2285* (Russian.) The Possibilities of Quasi-Solid Rotation of Liquids. **O vozmozhnosti kvazitverdogo vrashcheniia zhidkosti.** S. V. Zhak. *Prikladnaia Matematika i Mekhanika*, v. 21, no. 4, July-Aug. 1957, p. 569-570.

Mathematical analysis.

2286 The Flow Past a Rapidly Rotating Circular Cylinder. M. B. Glauert. *Royal Society, Proceedings*, v. 242, ser. A, Oct. 8, 1957, p. 108-115.

The solution of the flow in the boundary layer on the cylinder is obtained in the form of a power series in the ratio of the stream velocity to the cylinder's peripheral velocity, and expressions are deduced for the value of the circulation and the torque on the cylinder.

2287* Steady Convective Motion in a Horizontal Layer of Fluid Heated Uniformly From Above and Cooled Non-Uniformly From Below. Henry Stommel and George Veronis. *Tellus*, v. 9, Aug. 1957, p. 401-407.

A gravitationally stable fluid layer is heated non-uniformly (sinusoidally) at the bottom (or top) and a thermal convection regime is established. Examples are worked out for cases without rotation, with uniform rotation, and with non-uniform rotation (beta-plane).

2288 A Theoretical Analysis of Heat Transfer in Turbulent Convection. Yan Po Chang. *University of California (U. S. Atomic Energy Commission)*, AECU-3551, 1956, 24 p. (UF767 U3au Contin.)

Analysis of fully developed turbulent flow passing a flat plate at zero incidence and through a tube.

2289* (German.) Supersonic Flows With a High Mach Number Having Low Actual Velocities of Flow. **Überschallströmungen von hoher Machzahl bei kleinen Strömungsgeschwindigkeiten.** Carl Pfleiderer. *VDI Zeitschrift*, v. 99, no. 30, Oct. 1957, p. 1535-1536.

Slow velocity of sound in gas-and-liquid mixtures. Theoretical considerations. Application to a water jet air pump.

2290* (English.) **Advancement of a Compressible Heat Conducting Fluid Over an Infinite Flat Plate.** A. S. Gupta. *Zeitschrift für Angewandte Mathematik und Mechanik*, v. 37, nos. 9-10, Sept.-Oct. 1957, p. 349-353.

Equations of motion in the unsteady case when a compressible viscous fluid with vanishing pressure gradient flows past an infinite flat plate were integrated in semi-convergent expressions where the physical constants depend on temperature. Simple expressions are obtained for temperature and velocity distribution in the boundary layer, and drag coefficients and their dependence on physical constants.

2291* (English.) **Nonuniform Rotation of an Infinite Circular Cylinder in an Infinite Viscous Liquid.** D. D. Mallick. *Zeitschrift für Angewandte Mathematik und Mechanik*, v. 37, nos. 9-10, Sept.-Oct. 1957, p. 385-392.

See also: **1724** (mixing of high viscosity fluids); **1736** (pressure distribution in gas lines); **2025** (flow of viscous liquids); **2266** (blunt nosed thin cones in hypersonic flow); **2365** (heat transfer and pressure drop in heat exchangers); **2371** (flow in rocket nozzle); **2815** (flow of water in heated passages); **2946** (heat transfer to thick walls); **2976** (mixing in laminar-flow systems).

FOOD TECHNOLOGY

2292* Combined Irradiation-Heat Processing of Canned Foods. I. Cooked Ground Beef Inoculated With *Clostridium botulinum* Spores. Lloyd L. Kempe, John T. Graikoski, and Peter F. Bonventre. *Applied Microbiology*, v. 5, Sept. 1957, p. 292-295.

2293* (Italian.) Chromatographic Determination of Sorbic Acid Used as a Preservative in Beverages. **La ricerca cromatografica dell'acido sorbico impiegato come conservativo nelle bevande.** Emidio Sudario. *Chimica e l'Industria*, v. 39, no. 10, Oct. 1957, p. 811-814.

Concentrations of sorbic acid as antifermentation agent in sweet wines, and the best conditions for a complete action of the preservative. Two methods for the detection of sorbic acid and a new chromatographic method are described.

2294* Further Studies on the Preservation of Beef With Chlortetracycline. James M. Jay, H. H. Weiser, and F. E. Deatherage. *Food Technology*, v. 11, Nov. 1957, p. 563-566.

Deals with the phenomenon wherein low concentrations of chlortetracycline inhibits resistant strains of *Proteus, Pseudomonas* and strains of certain other genera in beef but not in complete nutrient media. Oxytetracycline and tetracycline acted in a similar manner although not as effectively. Effectiveness of the tetracycline antibiotics in retarding spoilage may be due to their ability to disturb the ionic balance in the product.

2295* Factors Affecting Quality of Prepackaged Meat. II. Color Studies. Effect of Storage Time, Storage Temperature, Antioxidants, Bacteria, Light, Freezing and Fat Upon Color of Product. John A. Rikert, Lawrence Bressler, C. Olin Ball, and Elizabeth F. Stier. *Food Technology*, v. 11, Nov. 1957, p. 567-573.

2296* Freeze-Dried Meat. V. Preparation Properties, and Storage Stability of Precooked Freeze-Dried Meats, Poulty, and Seafoods. A. L. Tappel, Ruth Martin, and Esther Plocher. *Food Technology*, v. 11, Nov. 1957, p. 599-603.

2297 Separation of Egg Yolk Proteins by Paper Electrophoresis. Robert John Evans and Selma L. Bandemer. *Journal of Agricultural and Food Chemistry*, v. 5, Nov. 1957, p. 868-872.

Paper electrophoresis offers a method for the study and segregation of egg yolk proteins without prior ether extraction.

See also: **1595** (control of citrus fruit decay).

FUELS AND COMBUSTION

2298 Heat Transfer by Radiation From Flames. A Summary of the Work of the International Flame Research Foundation. R. A. Sherman. *ASME, Transactions*, v. 79, Nov. 1957, p. 1727-1741.

The variables studied were the type of fuel oils or coke-oven gas, rate of heat input, type and rate of supply of atomizing agent, type of burner, excess of air, type and amount of carbureting agent for gas, and temperature of the combustion air. Of these, the C/H ratio of the oil and gas fuels and the mixing conditions most markedly affect the emissivity and radiation.

2299* (German.) The Role of the Carbon Dioxide Reduction Reaction During Coke Combustion. **Die Rolle der Kohlendioxyd-Reduktionsreaktion bei der Koksverbrennung.** S. F. Tschuchanow. *Brennstoff-Chemie*, v. 38, nos. 19-20, Oct. 1957, p. 289-297.

Reaction of CO_2 with C. Effects of H, steam, and CO_2. Division of the heterogeneous reaction into purely kinetic, kinetic, transition, and diffusion phases. Quantitative examination by means of the Semyenov number; industrial application.

2300 The Luminous Mantle of Fuel-Rich Oxyacetylene Flames. I. Spectroscopic Temperature Measurements. II. Free Radical and Continuum Intensities, and Their Influence on C_3 Emissions. G. V. Marr. *Canadian Journal of Physics*, v. 35, Nov. 1957, p. 1265-1283.

2301* (Russian.) Acetylene Formation During Incomplete Combustion of Methane in Oxygen. **Obrazovanie atsetilena pri nepolnom gorenii metana v kislorode.** Z. V. Ievleva and P. A. Tesner. *Doklady Akademii Nauk SSSR*, v. 115, no. 3, July 21, 1957, p. 537-540.

Study of incomplete combustion of methane in O with special consideration of the zones of formation of acetylene.

2302* The Effect of Mixing Conditions and Air Preheat on the Radiation From Liquid Fuel and Coke-Oven Gas Turbulent Jet Diffusion Flames. *Institute of Fuel, Journal*, v. 30, Oct. 1957, p. 553-576 + 3 plates.

Influence of mixing conditions on flame characteristics; control and instrumentation of experimental furnace; effect of preheated combustion air.

2303 Investigation of the Effect of Pressure on Flame Propagation. *Institut für Physikalische Chemie der Universität Göttingen, Technical Report for United States Air Force, Contract No.* AF61(514)-928, Mar. 1956-Mar. 1957, 21 p. (QD516 G55.86i Contin.)

Study of different hydrocarbons mixed with air, O_2, and other oxidants with varying O_2 contents showed that flame velocity decreases with increasing pressure when air is the oxidant. With pure O_2 as oxidant there are higher flame velocities at higher pressure.

2304* (Russian.) Thermo-Hydrolytic Dissociation of the Basic Organic Mass of Coal. **Termo-gidroliticheskoe rasshcheplenie osnovnoi organicheskoi massy kamennykh uglei.** V. I. Zabavin and L. A. Kleimenova. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1957, no. 8, Aug., p. 72-77.

Development of a method consisting essentially of gradual heating of the coal and its "residues" with α-naphthol at 280 C and with 5% solution of KOH in alcohol and pyridine mixture at 90 C, then separating acid and neutral substances from solution. With 4 to 6 treatments it is possible to transfer into solution and to dissociate into chemical components up to 80% of the organic coal mass.

2305 Spectroscopic Study of Electronic Flame Temperatures and Energy Distributions. Herbert P. Broida and Kurt E. Shuler. *Journal of Chemical Physics*, v. 27, Oct. 1957, p. 933-939.

The flames investigated were the stoichiometric H_2-O_2 and C_2H_2-O_2 flames at atmospheric pressure, a stoichiometric C_2H_2-O_2 flame at low pressure (2.1 mm) and a N + CO atomic flame (3.7 mm). Iron was added to the flames in the form of ferrocene to serve as a temperature and excitation "indicator".

2306* (German.) Pressure-Carbonization of Brown Coal in the Presence of Water. **Zur Kenntnis der Druckinkohlung von Braunkohlen in Gegenwart von Wasser. III.** E. Leibnitz, H.-G. Könnecke, and L. Lietz. *Journal für Praktische Chemie*, v. 5, nos. 1-2, Oct. 1957, p. 97-100.

Study of the process by low-temperature carbonization of secondary coal. Formation of humic acids at 300 C due to decarboxylation and dehydration.

2307* (Russian.) Spectral Analysis in Investigation of Coal Ashes. **Primenenie spektral'nogo analiza k issledovaniiu zoly iskopaemykh uglei.** A. K. Shubnikov, G. N. Soboleva, T. M. Bronovets, and A. I. Khrisanfova. *Khimiia i Tekhnologiia Topliva, i Masel*, 1957, no. 10, Oct., p. 1-5.

Determination of Fe and Al in coal ash by using standard methods of clay analysis.

2308* (Russian.) Thermographic Investigation of Coal and Coal Mixtures. **Termograficheskoe issledovanie uglei i ugol'nykh smesei.** Kh. A. Iskhakov. *Koks i Khimiia*, 1957, no. 10, p. 6-8.

Classification of coals by their thermographic curves. Determination of exo- and endo-thermal combustion periods, and prediction of certain technological properties.

2309* (Russian.) Laboratory Method of Composing Coking Charges. **Laboratornyi metod sostavleniia shikht dlia koksovaniia.** G. F. Ivlev. *Koks i Khimiia*, 1957, no. 10, p. 9-10.

Study of coking of different types of coal with respect to their swelling and degree of metamorphisis.

2310* (Russian.) Achievements in the Field of Coke Oven Construction. **Dostizheniia v oblasti konstruirovaniia koksovykh pechei.** I. B. Peisakhzon and N. K. Kulakov. *Koks i Khimiia*, 1957, no. 11, p. 23-29.

Surveys coke ovens constructed in Russia in last 40 yrs.

2311* (Russian.) Perfecting the Heating and Technological Problems of Coke Ovens. **Sovershenstvovanie teplovogo i tekhnologicheskogo rezhimov koksovykh pechei.** I. V. Virozub, A. I. Voloshin, and S. A. Shvarts. *Koks i Khimiia*, 1957, no. 11, p. 29-35.

Soviet advances and improvements in the construction and operation of coke ovens.

2312* (Czech.) Determination of Equivalent Composition of Natural Gas by a Calculation Based on Its Physical Constants. **Stanovenie ekvivalentného zloženia zemného plynu výpočtom z hodnot jeho fyzikálnych konštánt.** K. Böhm. *Paliva*, v. 37, no. 10, Oct. 1957, p. 333-336.

Derivation of mathematical relationship between chemical composition of natural gas and its physical constants, in particular between heating value and density.

2313* (Czech.) Method of Technological Calculations and Procedure for Design of Refinery for Generator Gas. **Methoda technologických výpočtů a postup při projektování čistírny generátorového plynu.** J. Vajnlich. *Paliva*, v. 37, no. 10, Oct. 1957, p. 340-347.

Procedure for simplified and speedy theoretical calculations of gas refining equipment and their application in industry.

2314* (Czech.) Possibilities of Production of City Gas by Gasifying Oil. **Možnosti výroby městského plynu zplyňováním olejů.** Fritz Rosendahl. *Paliva*, v. 37, no. 10, Oct. 1957, p. 347-354.

Design and operation of various oil gasifying installations.

2315* (Slovenian.) Study of Combustion Kinetics of Solid Fuels. **Prispevek k študiju kinetike zgorevanja trdnih goriv.** Bogomir Dobovišek and Lojze Sever. *Rudarsko-Metalurski Zbornik*, 1957, no. 3, p. 253-258.

Determination of combustion rate constant at various temperatures. Gives a formula for the relation between this constant and the temperature and rate of reaction.

2316 Sixth Symposium (International) on Combustion. 943 p. 1957. Reinhold Publishing Corp., New York. (QD516 Sy68)

Contains 125 papers on: structure and propagation of laminar and turbulent flames; high speed reactions; flame stabilization in fast streams; instability in combustion chambers; ignition; combustion of solid fuels, explosives, and solid propellants; evaporation and combustion of droplets and sprays; experimental and analytical techniques in combustion; applications of combustion.

2317 Low-Temperature Carbonization Assays of North American Coals. W. A. Selvig and W. H. Ode. *U. S. Bureau of Mines Bulletin* 571, 1957, 56 p. (TN21 Un3b)

Data from Fischer-Schrader assays at 500 C.

2318 Effect of Initial Mixture Temperature on Burning Velocity of Hydrogen-Air Mixtures With Preheating and Simulated Preburning. Sheldon Heimel. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4156, Oct. 1957, 23 p. (TL570 Un3t)

The effect of initial temperatures from about 300 to 700 K on the laminar burning velocity was determined from schlieren photographs of open flames. With 29.6 and 45.0% H (original mixture), mole-for-mole substitution of N for water vapor in the preburning experiments caused no discernible change in burning velocity.

2319 Mechanism and Kinetics of the Reaction Between Fuming Nitric Acid and/or Its Decomposition Products and Gaseous Hydrocarbons. Francis R. Taylor, Barbara G. Faunce, Nancy K. Asawa, and Albert L. Myerson. *Wright Air Development Center, Aeronautical Research Laboratory, WADC Technical Report* 57-138, June 1957, 54 p. (TL507 Un3.18w Vis.)

Pressure-composition ignition limits and flames of C_3H_8-NO_2 mixtures. Product analysis of cool and two-stage flames occurring in C_3H_8-NO_2 mixtures. Ultra-violet flash spectroscopy.

2320 A Single Generalized Chart of Detonation Parameters for Gaseous Mixtures. Robert G. Dunn and Bernard T. Wolfson. *Wright Air Development Center, Aeronautical Research Laboratory, WADC Technical Note* 57-263, Aug. 1957, 11 p. (TL507 Un3.18t Contin.)

Chart involves only non-dimensional quantities and presents in graphical form generalized equations derived from the classical equations of detonation.

See also: **1695** (refractory concrete for boiler furnaces); **3040** (specifications for coal-fired boilers).

GEOLOGY, GEOPHYSICS, MINERALOGY, AND MINING ENGINEERING

2321 Advances in Electronics and Electron Physics. L. Marton, editor. v. IX. 347 p. 1957. Academic Press, New York. (TK161 A95e Vis.)

Papers on aurora borealis; negative ions; radio observation of meteors; intensity variations in cosmic rays; radio-wave propagation; and electronics in oceanography, seismology, and geomagnetism.

2322* Environmental Studies of Carboniferous Sediments. I. Geochemical Criteria for Differentiating Marine From Fresh-Water Shales. E. T. Degens, E. G. Williams, and M. L. Keith. *American Association of Petroleum Geologists, Bulletin*, v. 41, Nov. 1957, p. 2427-2455.

In the region studied it appears possible to differentiate marine shales from fresh-water shales by quantitative spectrographic determination of B, Ga, and Rb.

2323* A Method to Determine the Isotopic Ratio of Thorium^{232} to Thorium^{230} in Minerals. Elizabeth Rona. *American Geophysical Union, Transactions*, v. 38, Oct. 1957, p. 754-759.

Amount of Th^{232} was determined by activation analysis and that of Th^{230} by counting its α particles. The ratio was calculated by comparing the β and α activities of the two isotopes in the sample to those of a standard of known Th^{232} to Th^{230} ratio.

2324 Combination Twinning in Plagioclase Felspars. J. V. Ross. *American Journal of Science*, v. 255, Nov. 1957, p. 650-655.

Crystals combine along smooth composition planes, normally (010), and their combination is governed by either the Carlsbad, Albite-Carlsbad, or Albite-Ala law. Such combination is believed to be characteristic of truly magmatic rocks, and thus may be a useful criterion for separating magmatic from metamorphic or metasomatic rocks.

2325* (French.) Rapid Mine-Shaft Sinking. **Creusement des puits à grande vitesse d'avancement.** E. Dessales. *Annales des Mines de Belgique*, 1957, no. 9, Sept., p. 906-911.

Rapid sinking in gold mines around Johannesburg, South Africa, was obtained by sinking and lining at the same time, using a rather liquid concrete distributed through pipes at the rear part of the forms.

2326* (English.) **The Geomagnetic Measures for the Time-Variations of Solar Corpuscular Radiation, Described for Use in Correlation Studies in Other Geophysical Fields.** J. Bartels. *Annals of the International Geophysical Year*, v. 4, pts. 4-7, 1957, p. 227-236.

2327* (English.) **Electronic Recording of the Transient Variations in the Earth's Magnetic Field.** A. Maxwell. *Annals of the International Geophysical Year*, v. 4, pts. 4-7, 1957, p. 281-286.

A method of making continuous records of the variations in the terrestrial magnetic field by a fluxgate (saturable inductor) magnetometer.

2328* (English.) **Cosmic-Radiation Neutron Intensity Monitor.** J. A. Simpson. *Annals of the International Geophysical Year*, v. 4, pts. 4-7, 1957, p. 351-373 + 2 plates.

The neutron monitor pile. Electronic circuits; registration of data; proportional counters; auxiliary and test equipment; operation and maintenance; factors affecting counting rate; correlation of data to standard atmospheric pressure.

2329* Ionospheric Irregularities Causing Random Fading of Very Low Frequencies. S. A. Bowhill. *Journal of Atmospheric and Terrestrial Physics*, v. 11, no. 2, 1957, p. 91-101.

The process by which random irregularities in the ionosphere cause random fading in a reflected radio wave at the ground may be divided into two parts: the scattering process within the layer which builds up an inhomogeneous field in free space immediately beneath it; and the diffraction process by which this field propagates to the earth's surface, possibly changing in form as it travels.

2330* Self-Distortion of Radio Waves in the Ionosphere, Near the Gyro Frequency. F. H. Hibberd. *Journal of Atmospheric and Terrestrial Physics*, v. 11, no. 2, 1957, p. 102-110.

The reduction in modulation depth varies only slowly with wave frequency near the gyro frequency, and shows no resonant-like variation. The reduction is proportional to the power radiated, is greatest for low modulation frequencies, and decreases rapidly as the modulation frequency is increased.

2331* The Collision Efficiency of Cloud Drops of Equal Size. R. M. Schotland. *Journal of Meteorology*, v. 14, Oct. 1957, p. 381-385.

The collision rate is proportional to the square of the ratio of cloud liquid-water content to drop size.

2332* Dispersion in the Upper Atmosphere. J. G. Edinger and R. R. Rapp. *Journal of Meteorology*, v. 14, Oct. 1957, p. 421-425.

Transosonde balloon data are analyzed to provide a measure of the dispersion on a large scale in the upper atmosphere. An expression for the autocorrelation function is inferred from synoptic experience and is applied to autocorrelation values computed from the balloon data.

2333* An Airborne Flame Photometer and Its Use in the Seanning of Marine Atmospheres for Sea-Salt Particles. A. H. Woodcock and A. T. Spencer. *Journal of Meteorology*, v. 14, Oct. 1957, p. 437-447.

Details of an instrument for the identification of large Na-bearing aerosols from aircraft.

2334* (Russian.) The Problem of Movement of Two Bodies With Variable Masses. **K zadache o dvizhenii dvukh tel s peremennymi massami.** V. S. Novoselov. *Leningradskogo Universiteta, Vestnik, Seriia Matematiki, Mekhaniki i Astronomii*, v. 12, no. 13, 1957, p. 129-131.

Derivation of equations describing celestial bodies, the masses of which increase by accumulations from cosmic clouds.

2335 A High-Temperature Oil Well Cement. I. R. Dunlap and F. D. Patchen. *Petroleum Engineer (Management Ed.)*, v. 29, Nov. 1957, p. B60 + 4 pages.

At depths greater than 15,000 ft. and at bottom-hole temperatures exceeding 300 F, carboxymethyl hydroxyethyl cellulose has exceptional retarding properties, and maintains low slurry viscosity for extended periods.

2336 Surfactant Treatment Selectively Seals Off Water Entry. W. E. Brown. *Petroleum Engineer (Management Ed.)*, v. 29, Nov. 1957, p. B72 + 4 pages.

Injection of surfactant in oil wells forms a water-in-oil emulsion with formation water to block flow, but does not effect oil-producting zones.

2337 Magnetohydrodynamic Shock Waves in the Solar Corona, With Applications to Bursts of Radio-Frequency Radiation. K. C. Westfold. *Philosophical Magazine*, v. 2, ser. 8, Nov. 1957, p. 1287-1302.

2338 Celestial Mechanics of Artificial Satellites. Theodore E. Sterne. *Sky and Telescope*, v. 17, Dec. 1957, p. 66-68.

2339* (English.) **On a Special Aspect of the Condensation Process and Its Importance in the Treatment of Cloud Particle Growth.** C. Rooth. *Tellus*, v. 9, Aug. 1957, p. 372-377.

Available data on the rate of exchange of molecules between liquid water and vapor in contact with it are analyzed in relation to atmospheric condensation and evaporation processes. It is shown that this exchange process exerts a quenching action on the rate of growth of small droplets that should contribute to the formation of a broad size spectrum.

2340* A New Technique for Counting Ice-Forming Nuclei in Aerosols. E. K. Bigg. *Tellus*, v. 9, Aug. 1957, p. 394-400.

2341 Atmospheric Temperature Observations to 100,000 Feet for Several Climatological Regions of the Northern Hemisphere. H. B. Tolefson. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4169, Nov. 1957, 26 p. (TL570 Un3t)

Summarizes radiosonde measurements of upper-air temperatures from nine stations at heights up to 100,000 ft.

2342* (Russian.) Study of the Composition of the Initial Cosmic Radiation. **Issledovanie sostava pervichnogo kosmicheskogo izlucheniia.** S. N. Vernov, V. L. Ginzburg, L. V. Kurnosova, L. A. Razorenov, and M. I. Fradkin. *Uspekhi Fizicheskikh Nauk*, v. 63, nos. 1a-1b, Sept. 1957, p. 131-148.

Data on cosmic rays obtained since 1953.

2343* (Russian.) Study of the Variation of Cosmic Radiation. **Issledovanie variatsii kosmicheskogo izlucheniia.** S. N. Vernov, Iu. I. Logachev, A. E. Chudakov, and Iu. G. Shafer. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 1b, Sept. 1957, p. 149-162.

The possibility of using an artificial satellite for studying cosmic radiation; construction of the equipment needed.

2344* (Russian.) Study of Ultra-Violet Short-Wave Sun Radiation. **Issledovaniia korotkovolnovogo ul'trafioletovogo izlucheniia solntsa.** S. L. Mandel'shtam and A. I. Efremov. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 1b, Sept. 1957, p. 163-180.

Theoretical and experimental data related to radiation of waves shorter than 2900 Å; description of experiments which are planned using an artificial satellite.

2345* (Russian.) Investigation of the Composition of High-Atmospheric Layers by Means of Rockets. **Raketnye issledvaniia sostava atmosfery na bol'shikh vysotakh.** B. A. Mirtov. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 1b, Sept. 1957, p. 181-196.

Equipment used in taking samples from the high atmospheric layers. Storing and analysis of specimens and data on work conducted in 1951-1956.

2346* (Russian.) Measuring the Pressure of the High-Atmospheric Layers. **Izmerenie davleniia v verkhnei atmosfere.** V. V. Mikhnevich. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 1b, Sept. 1957, p. 197-204.

Equipment and results of measurements at 50 to 100 km.

2347* (Russian.) Problems of Measurement of Pressure and Density of High-Atmospheric Layers by Means of an Artificial Satellite. **Zadacha izmereniia davleniia i plotnosti vysokikh sloev atmosfery s pomoshchiu iskusstvennogo sputnika zemli.** B. S. Danilin, V. V. Mikhnevich, A. I. Repnev, and E. G. Shvidkovskii. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 1b, Sept. 1957, p. 205-225.

2348* (Russian.) Investigation of the Ionic Composition of Ionized Atmospheric Layers. **Issledovanie ionnogo sostava ionizirovannykh sloev atmosfery.** B. A. Mirtov and V. G. Istomin. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 1b, Sept. 1957, p. 227-238.

Chemical composition of the ionosphere; possibilities of using an artificial satellite for such study.

2349* (Russian.) Measuring the Positive Ion Concentration Along the Orbit of an Artificial Satellite. **Izmerenie kontsentratsii polozhitel'nykh ionov vdol' orbity iskusstvennogo sputnika zemli.** K. I. Gringauz and M. Kh. Zelikman. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 1b, Sept. 1957, p. 239-252.

The possibilities of using an artificial satellite in study of the concentration of ions and electrons in the ionosphere.

2350* (Russian.) Investigation of the Solid Components of Interplanetary Space by Means of Rockets and Artificial Satellites. **Issledovanie tverdoi sostavliaiushchei mezhplanetnogo veshchestva s pomoshch'iu racket i iskusstvennykh sputnikov zemli.** S. M. Poloskov and T. N. Nazarova. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 1b, Sept. 1957, p. 253-265.

Discussion of the two most important problems which should be investigated: determination of the flow of meteor particles and study of their spectra.

2351* (Russian.) Measuring the Electrostatic Fields of High-Atmospheric Layers. **Izmerenie elektrostaticheskikh polei v verkhnikh sloiakh zemnoi atmosfery.** I. M. Imianitov. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 1b, Sept. 1957, p. 267-282.

Peculiarities of measurements; necessary equipment.

See also: **1587** (Russian satellite orbit computations); **1588** (Russian satellite orbit computations); **1589** (Russian satellite orbit computations); **2287** (convective motion of fluid layers); **2792** (geophysical radioactivity measurements); **2919** (heat conduction principles).

GRAPHIC ARTS

2352* The Choice of Electric Drive for Rotary Printing Machines. P. Wolfensberger. *Brown Boveri Review*, v. 44, Aug. 1957, p. 324-329.

The mode of operation of the rotary printing machine. Demands made on the drive. Slipring, a.c., commutator, and d.c. motors. Other drive components.

2353* High-Speed and Ultra-High-Speed Photography in Electrical Engineering. A. F. B. Young and J. G. C. Steele. *Journal of Photographic Science*, v. 5, Sept.-Oct. 1957, p. 112-120.

Photographic techniques and high-speed ciné-cameras are used in research on large high-voltage electrical circuit-breakers at power-stations.

2354* Cinematography of Combustion in Diesel Engines. J. G. G. Hempson and R. Watts. *Journal of Photographic Science*, v. 5, Sept.-Oct. 1957, p. 121-125.

Methods used to film the injection and combustion processes in some forms of diesel combustion chambers.

2355* A Pneumatic Apparatus for Measuring the Flatness of Photographic Plates. J. C. Evans and I. G. Morgan. *Microtecnic (English Ed.)*, v. 11, no. 4, 1957, p. 170-172.

2356 Variation of Photographic Resolving Power With Lateral Chromatic Aberration. John M. O'Connell. *Optical Society of America, Journal*, v. 47, Nov. 1957, p. 1018-1020.

Small amounts of lateral chromatic aberration have a strong, adverse effect upon resolving power, which demand careful correction in photographic lenses required to resolve fine detail.

2357* Some Aspects of the Mechanism of Development With a Substituted *p*-Phenylenediamine. The Kinetics of Physical and Chemical Development. R. B. Pontius and Joan S. Thompson. *Photographic Science and Engineering*, v. 1, no. 2, Oct. 1957, p. 45-51.

Kinetics of postfixation physical development of Eastman Fine Grain Release Positive Film, Type 5302, with the color developer, 4-amino-3-methyl-N-ethyl-N-(β-methylsulfonamidoethyl)-aniline, were determined. Evidence is presented for development by a *p*-phenylenediamine developer while adsorbed to Ag and a direct comparsion is made between the kinetics of chemical and pure physical development by the same developer.

2358* Electronmicroscopic Investigations of Photographic Layers. E. Klein. *Photographic Science and Engineering*, v. 1, no. 2, Oct. 1957, p. 52-55.

Deleterious effects of radiation on Ag and Ag halide crystals are eliminated by a technique in which the specimen is first covered with a thin carbon skin and is then dissolved to leave the skin replica for examination.

2359* Control of Low-Intensity Reciprocity Law Failure With Mercaptooxazoline Development Retarders. Ernest T. Larson and Harold A. Levine. *Photographic Science and Engineering*, v. 1, no. 2, Oct. 1957, p. 59-62.

Control of reciprocity failure by development retarders is explained in terms of the slower developability of latent image formed at moderate and high exposure intensities.

2360* Printing Motion-Picture Films Immersed in a Liquid. I. Contact Printing. John G. Stott, George E. Cummins, and Hemri E. Breton. **II. Optical Printing.** John R. Turner, Duane E. Grant, and Henri E. Breton. *Society of Motion Picture and Television Engineers, Journal*, v. 66, Oct. 1957, p. 607-615.

Methods give high quality motion-picture prints from badly scratched negatives.

2361* Data-Recording Xenon Flashlamp. Edward A. Colson and Harold E. Edgerton. *Society of Motion Picture and Television Engineers, Journal*, v. 66, Oct. 1957, p. 616-618.

Electronic flashtube is resistant to extreme temperature variations, shock, and vibrations. It is designed for data recording under the environmental conditions that one encounters in military aircraft.

2362* (Russian.) Color Separating Experiments of Multilayer Color-Photographic Materials. **Tsvetodelitel'nye ispytaniia mnogosloinykh tsvetofotograficheskikh materialov.** N. F. Semenova. *Tekhnika Kino i Televideniia*, 1957, no. 10, Oct., p. 45-54.

Method to quantitatively characterize the color separating properties of color-photographic materials.

See also: **1674** (removal of gelatin from triacetate film); **2275** (high-speed photographic study of cavitation).

HEAT POWER

2363 An Aerodynamic Screen for Jet Engines. Harold Klein. *Aeronautical Engineering Review*, v. 16, Nov. 1957, p. 48-53.

The blowaway jet represents a simple, safe, economical scheme for effecting a very large reduction in the amount of engine damage to be expected due to material pickup from the runways.

2364* (French.) Combustion Processes in Aeronautical Propulsion. **La combustion dans la propulsion aéronautique.** Jean Surugue. *Âge Nucléaire*, 1957, no. 6, Sept.-Oct., p. 60-64.

Theoretical review of combustion in jet engines.

2365* Correlations Relating Heat Transfer and Pressure Drop in Compact Heat Exchangers. Hilbert Schenck, Jr. *American Society of Naval Engineers, Journal*, v. 69, Nov. 1957, p. 767-770.

Studies of heat transfer equipment associated with gas-turbine power units.

2366* Three Unconventional Engines. Robert A. Gross. *Astronautics*, v. 2, Oct. 1957, p. 44 + 3 pages.

The three unconventional but interesting power sources discussed here are the artificial oxidant engine, the electrochemical cell, and the human muscle.

2367* (French.) Relationship Between Scale Formation and Temperature of the Water-Heated Surface Interface With Regard to the Chemical Composition of the Boiler Water. **Relation entre la formation d'incrustations et la température de la zone limite "eau - surface réchauffée" par rapport à la composition chimique d l'eau de chaudière.** Giovanni Bianucci and Leonardo Ghiringhelli. *Centre Belge d'Etude et de Documentation des Eaux, Bulletin (Trimestrielle)*, 1957, no. 37, p. 157-163.

Studies of the precipitation of Ca in the form of carbonate or sulfate in steam boilers.

2368 Solid Propellants Vie With Liquids for Rockets. H. W. Ritchey. *Chemical and Engineering News*, v. 35, Nov. 11, 1957, p. 78-82.

For most military uses, solid rocket propellants can now compete with liquids, offering ease of manufacture and handling, and reliability. Current progress in the field is summarized.

2369 Anhydrous Hydrogen Peroxide as a Propellant. Ralph Bloom, Jr. and Norris J. Brunsvold. *Chemical Engineering Progress*, v. 53, Nov. 1957, p. 541-547.

Manufacture of anhydrous H_2O_2 by concentrating H_2O_2 solutions, utilizing the freezing properties of these solutions to accomplish fractional crystallization. Properties, performance, and handling and storage characteristics.

2370 Correlation of Data for Pressure Loss in a Cannular J-73 Combustor. R. E. Motsinger. *General Electric Atomic Products Division (U. S. Atomic Energy Commission)*, APEX-320, Aug. 1957, 25 p. (UF767 Un3.1ap Contin.)

Evaluation of pressure loss in a chemical combustor over a wide range of inlet conditions, particularly with respect to temperature, and over a wide range of heat additions.

2371* (Russian.) On the Exact Calculation of the Supersonic Part of a Straight Nozzle. **K tochnomu rashchetu sverkhzvukovoi chasti ploskogo sopla.** P. G. Barantsev. *Leningradskogo Universiteta, Vestnik, Seriia Matematiki, Mekhaniki i Astronomii*, v. 12, no. 13, 1957, p. 89-92.

A method is given for the exact solution of Goursat's equations for the supersonic part of a nozzle, when velocity values are known along the nozzle axis.

2372* (French.) Measuring the Characteristic Times of Evolution of Combustion in a Liquid Propellant Rocket Motor. **La mesure des temps caractéristiques de l'évolution de la combustion dans une chambre de fusée a propergol liquide.** M. Barrère, A. Moutet, and P. Sarrat. *Recherche Aéronautique*, 1957, no. 60, Sept.-Oct. 1957, p. 29-40.

Concentrated and distributed combustion; cybernetic analogy transfer function. Method of sinusoidal modulation of output. Advantages of thermodynamic methods.

2373 Instruments Measure Unburned Hydrocarbons in Auto Exhaust. J. C. Neerman and G. H. Millar. *SAE Journal*, v. 65, Nov. 1957, p. 58-60.

Two instruments, an infra-red interference photometer and a viscous matrix airflow meter, permit measurement of incompletely burned hydrocarbons.

2374* (Norwegian.) Recent Development in Semi-Diesel Motors. **Semidieselmotorens nyere utviklung.** Ivar B. Stokke. *Teknisk Ukeblad*, v. 104, Oct. 10, 1957, p. 831-836.

Construction and advantages of new semi-diesel motor with a small internal incandescent body which gives better fuel distribution, lower fuel consumption, and quicker and safer starting.

2375 Effect of Surface-Active Additives on Physical Behavior of 50-Percent Slurries of 1.5-Micron Magnesium in *n*-Decane. Murray L. Pinns. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* E54K22a, Feb. 1955, 54 p. (TL782 Un3rm Vis.)

Concentration and molecular structure of the additive, presence of moisture, and characteristics of the Mg powder controlled the viscosity of the slurry. Other factors were temperature and age of the slurry. The additives that yielded the most fluid slurries had a hydroxyl group together with one or more ester, metal salt, or polyoxyethylene groups in the molecule.

2376 Blow-Out Velocities of Several Slurry and Liquid Fuels in a 1⅜-Inch Diameter Combustor. James F. Morris, Robert M. Caves, and Albert M. Lord. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* E54L27a, Feb. 1955, 12 p. (TL782 Un3rm Vis.)

2377 Performance of Pure Fuels in Single J33 Combustor. II. Hydrocarbon and Nonhydrocarbon Fuels. III. Five Hydrocarbon Gaseous Fuels and One Oxygenated-Hydrocarbon Gaseous Fuel. Arthur L. Smith and Jerrold D. Wear. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* E55BO2, Apr. 1955, 63 p; E55KO4a, Feb. 1956, 36 p. (TL782 Un3rm Vis.)

Investigations of isooctane, *n*-pentane, isopentane, 2,2-dimethylbutane, pentene-2, methanol, propylene oxide, diethyl ether, acetone, carbon disulfide, acrolein, acrylonitrile, butylsilane propane, ethane, ethylene, acetylene, 1,3-butadiene, and ethylene oxide.

2378 NACA Research on Slurry Fuels Through 1954. Walter T. Olson and Roland Breitwieser. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* E55B14, Apr. 1955, 30 p. (TL782 Un3rm Vis.)

Research included slurries of B for greater flight range and of Mg for greater thrust than is possible with hydrocarbons alone. Although slurries that are stable and fluid enough for research have been made, their physical properties are not yet good enough for use in aircraft. Combustion tests show poor performance for B, and excellent performance for Mg.

2379 Preparation and Handling of Magnesium-Hydrocarbon Slurries for Jet-Engine Applications. Henry C. Barnett, A. M. Lord, and P. H. Wise. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* E55DO1, June 1955, 60 p. (TL782 Un3rm Vis.)

Includes details of slurry preparation, physical properties, storage, experimental fuel systems, disposal of solid combustion products, flammability hazards, and physiological hazards.

2380 Preparation of 50 Percent Boron-Hydrocarbon Slurries Using Combinations of Glycerol Sorbitan Laurate With Various Thickeners. Irving A. Goodman and Virginia O. Fenn. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* E55E17, July 1955, 30 p. (TL782 Un3rm Vis.)

Commercial thickening products tested were aluminum octoate, acetylene black, silica aerogel, fine synthetic silica, hydrated magnesium aluminum silicate, phenolic resin microballons, and dimethyl-dioctadecyl ammonium bentonite. The various additive formulations were evaluated on the basis of their effect on the viscosity, settling characteristics, and general physical appearance of the slurries.

2881 Effect of Temperature on Viscosity of Slurries of Boron and Magnesium in JP-5 Fuel. Harold F. Hipsher. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* E55E19, July 1955, 20 p. (TL782 Un3rm Vis.)

Plastic viscosities of the B slurries decreased consistently with an increase in temperature. Apparent viscosity did not change regularly with temperature. An exponential curve of the form $\log y = aT + b$ fits the viscosity-temperature relation for the Mg slurries from about 0 to 80 C, but does not fit the data below zero C. The plastic viscosity and yield value of these slurries decreased with increasing temperature.

2382 Effect of Surface-Active Additives on Physical Properties of Slurries of Vapor-Process Magnesium. Murray L. Pinns. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* E55H26, Nov. 1955, 22 p. (TL782 Un3rm Vis.)

Brookfield apparent viscosities, plastic viscosities, and yield values of the slurries decreased progressively with increasing concentration of additive up to a concentration of 3 to 5%, based on the weight of slurry. A polyoxyethylene dodecyl alcohol was the most effective of 13 additives tested in reducing the Brookfield apparent viscosity and yield value.

2383 An Experimental Investigation of a Flat Ram-Jet Engine on a Helicopter Rotor. Robert D. Powell, Jr. and James P. Shivers. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* L55F28, Jan. 1956, 27 p. (TL782 Un3rm Vis.)

Propulsive and aerodynamic characteristics were determined on the Langley helicopter test tower and compared with results obtained in previous tests of an equivalent engine with circular cross section.

2384 Effect of Plastic Viscosity and Yield Value on Spray Characteristics of Magnesium-Slurry Fuel. George M. Prok. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* E56J19a, Jan. 1957, 23 p. (TL782 Un3rm Vis.)

In the range of plastic viscosity and yield value studied, there was no variation in the mean drop sizes, drop sizes across spray cross section, or spray intensity. Neither the type of surface-active additive used nor the amount of that additive had any effect on the atomization of the slurry.

2385 Drop-Size Distribution for Crosscurrent Breakup of Liquid Jets in Airstreams. Robert D. Ingebo and Hamption H. Foster. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4087, Oct. 1957, 36 p. (TL570 Un3t)

Studies of performance of jet engines. Drop-size-distribution data were obtained by using simple orifice injectors oriented normal to the airflow. The breakup of fuel jets was investigated for ranges of injector, liquid, and airstream variables.

2386 Propellant Vaporization as a Criterion for Rocket-Engine Design; Calculations Using Various Log-Probability Distributions of Heptane Drops. Richard J. Priem. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4098, Oct. 1957, 29 p. (TL570 Un3t)

Vaporization rates of *n*-heptane sprays in a rocket combustion chamber were computed for various log-probability distributions and mass-median drop sizes of the spray and for an engine operating with various injection and final gas velocities, initial fuel temperatures, and chamber pressures.

See also: **1704** (cermet turbine blades); **1728** (boiler water treatment); **2262** (flow in compressor cascade); **2263** (flow in turbine nozzle); **2354** (cinematography of combustion in diesel engines); **2492** (turbojet engines with Inconel 550 blades); **2508** (corrosion in condensers); **2513** (corrosion in steam condenser tubes); **2691** (properties of compressor blades).

INFORMATION—PREPARATION AND DISSEMINATION

2387* Research and Developments in Documentation. Jesse H. Shera. *Library Trends*, v. 6, Oct. 1957, p. 187-206.

Analyzes research in progress; points out trends and possible future developments.

2388 Management-Employee Communication in Action. Harold P. Zelko and Harold J. O'Brien. 177 p. 1957. Howard Allen Inc., Cleveland. (HF5549.C6 Z37m)

Effective speech principles and their application to the problems of speaking, conferences and meetings, personal relations, interviewing and counseling, and also the written mediums for industrial communication.

2389 The New Dictionary of Thoughts. A Cyclopedia of Quotations. Tryon Edwards, compiler. Rev. Ed. 794 p. 1957. Standard Book Co., New York. (PN6081 Ed98n)

A collection of 20,000 quotations from 1800 authors, alphabetically arranged under 1000 topics cross-indexed for ready reference.

2390 Bibliography on Reproduction of Documentary Information, 1955-September 1957. Loretta J. Kiersky. *Special Libraries*, v. 48, Nov. 1957, p. 405-409.

Covers methods, equipment, storage procedures, and standards.

See also: **1994** (physical and chemical data sources).

INSTRUMENTATION

2391 Use of Piezoresistive Materials in the Measurement of Displacement, Force, and Torque. W. P. Mason and R. N. Thurston. *Acoustical Society of America, Journal*, v. 29, Oct. 1957, p. 1096-1101.

Piezoresistance effect; materials whose piezoelectric effect is of interest; use as a strain gage. A torsional transducer constructed from *n*-type Ge.

2392 Heat Bridge for Measuring Thermal Conductivity. G. F. Landegren. *American Journal of Physics*, v. 25, Nov. 1957, p. 532-534.

Apparatus is analogous to the Wheatstone bridge for measuring electrical resistance.

2393* A Continuous Freeze Drier for Laboratory Studies. M. Rhian, H. G. Maister, and R. S. Hutton. *Applied Microbiology*, v. 5, Sept. 1957, p. 323-331.

Construction and operation of a continuous freeze drier suitable for preparing up to 60 g. of dry material per hr.

2394 A Fixture for Compression Testing of Sheet Materials at Elevated Temperatures. B. L. Molander, C. R. Waldron, and J. C. Newland. *ASTM Bulletin*, 1957, no. 225, Oct., p. TP187-TP189.

2395* A New Absolute Method of Hygrometry. I. The General Principles of the Method. R. G. Wylie. *Australian Journal of Physics*, v. 10, Sept. 1957, p. 351-365.

An ionic single crystal is surrounded by the gas which is the subject of measurement, and the temperature of the whole is so adjusted that a very thin layer of saturated solution is formed on the crystal surface and is brought to a constant thickness as determined electrically.

2396 Prediction of Particle Size Retention for Papers, Felts, and Nonwoven Fabrics. J. F. Zievers, R. W. Crain, and W. L. Werchun. *Chemical Engineering Progress*, v. 53, Oct. 1957, p. 493-496.

A practical method for determining retention qualities of filter media.

2397* (German.) An Optical Interrupter and 45°-Reflection Attachment for the Beckman Spectrophotometer DK I and DK II. **Optischer Unterbrecher und 45°-Reflexionszusatz für die Beckman-Spektralphotometer DK I und DK II.** K. Hoffmann. *Chemie-Ingenieur-Technik*, v. 29, no. 10, Oct. 1957, p. 652-656.

Interrupter can be interchanged with the chopper already installed. Reflection attachment makes possible the recording of reflection curves in the visible and near infra-red.

2398 Use Capacitance for Accurate Level Measurement. F. W. Hannula. *Control Engineering*, v. 4, Nov. 1957, p. 104-107.

Basic principles of the method; equipment; applications.

2399* (German.) Damping of Fast-Vibrating Recording Systems. **Dämpfung schnellschwingender Registriersysteme.** Siegfried Götze. *ETZ, Elektrotechnische Zeitschrift*, v. 78, Ausgabe A, no. 20, Oct. 1957, p. 729-733.

The fundamental frequency and the correct alignment of damping of the measuring instruments are prerequisites of full-scale recording of fast changing values. This newly developed method insures a satisfactory damping.

2400* A Discussion of Present Day Dynamometers: Their Application, Operation, and Control. Roy F. Knudsen. *General Motors Engineering Journal*, v. 4, Oct.-Dec. 1957, p. 18-24.

2401 Electron Microscopy of Magnesium Oxide Particles Collected on Membrane Filters. R. Borasky and B. Mastel. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-46722, Jan. 1956, 13 p. (UF767 Un3.1hw Contin.)

Data showing the effects of processing steps required in three methods of transferring MgO particles from membrane filters to Formvar coated electron microscope specimen screens. Electron micrographs were analyzed for particle population, size distribution, and aggregation characteristics.

2402 A Subminiature Self-Recording Accelerometer for High Shock Duty. H. W. Erichsen and D. J. Ettelman. *Institute of Radio Engineers, Transactions on Instrumentation*, v. I-6, Sept. 1957, p. 178-181. (TK1 In6.6i Vis.)

2403* Relative Merits of Pneumatic Controllers for Industrial Processes Laboratory Tests. A. Buratti and R. J. R. Stickland. *Instrument Practice*, v. 11, Oct. 1957, p. 1039-1047.

Eighteen tests relative to the merit of a controller are summarized.

2404 Bridge and EMF Measurements via the Resistance Bridge Indicator. Richard E. George. *Instruments and Automation*, v. 30, Nov. 1957, p. 2061-2063.

Details of a servo-balanced instrument for efficient use of resistance-bridge transducers such as strain gages, resistance thermometers, and load and pressure cells; can be used also as a potentiometer.

2405* An Apparatus for Measurement of Thermal Conductivity of Solids at Low Temperatures. Robert L. Powell, William M. Rogers, and Don O. Coffin. *Journal of Research, National Bureau of Standards*, v. 59, Nov. 1957, p. 349-355.

2406* Electron Diffraction Analysis in the U. S. S. R. S. A. Semiletov. *Journal of Scientific & Industrial Research*, v. 16, sec. A, Sept. 1957, p. 377-393.

A review of recent work.

2407 A Precision Capsule-Type Pressure Gauge for the Range 0-20 mm. of Mercury. R. W. Crompton and M. T. Elford. *Journal of Scientific Instruments*, v. 34, Oct. 1957, p. 405-407.

Gage is direct-reading and independent of the nature of the gas under pressure.

2408 Automatic Recording Reflectometer for Measuring Diffuse Reflectance in the Visible and Infrared Regions. Willard L. Derksen, Thomas I. Monahan, and Alfred J. Lawes. *Optical Society of America, Journal*, v. 47, Nov. 1957, p. 995-999.

2409 Ways to Control Temperatures Accurately and Economically. William C. West, Jr. *Precision Metal Molding*, v. 15, Nov. 1957, p. 79-80.

Use of filled and resistance thermometers, thermocouples, and optical pyrometers; basic types of control.

2410 Mach-Zehnder Interferometer for Diffusion Measurements in Volatile Liquid Systems. C. S. Caldwell, J. R. Hall, and A. L. Babb. *Review of Scientific Instruments*, v. 28, Oct. 1957, p. 816-821.

2411* A Note on the Use of Plastic Positive Replicas for Light Microscopy. H. W. Emerton and D. H. Page. *Royal Microscopical Society, Journal*, v. 76, ser. 3, pt. 3, 1956, p. 113-116 + 2 plates.

The value of a two-stage replica method for the light microscopy of surfaces is stressed. The replica is made in an optically homogeneous transparent plastic and is metal shadowed to give a more informative image of good contrast.

2412* (French.) Furnaces and Temperature Regulators for Physico-Chemical Studies up to 1700 C. **Fours et régulateurs de température pour études physico-chimiques jusqu'à 1700° C.** Georges Urbain and Gilbert Cavalier. *Silicates Industriels*, v. 22, Oct. 1957, p. 527-532.

Comparison of carbon tube vs. Mo-wound furnaces.

2413 (German.) Glass Apparatus With an Optimum Efficiency as a Result of Modern Processing and Design. **Glasapparate mit optimalem Arbeitseffekt als Folge neuzeitlicher Verfahrens- und Konstruktionstechnik.** H. P. Helmrich. *Technik*, v. 12, Sept. 1957, p. 603-606.

Construction of glass apparatus. Initial problems. Collaboration of the engineer and the chemist in conceiving the best construction methods. Applications to different distilling apparatus.

2414* (German.) The Use of Thermomolecular Effects for Producing a Pumping Effect and for Isolating Gas and Isotope Mixtures. **Über die Verwendbarkeit thermomolekularer Effekte zur Schaffung von Pumpwirkungen sowie zur Trennung von Gas- und Isotopengemischen.** Hans Baum. *Vakuum-Technik*, v. 6, no. 7, Oct. 1957, p. 154-159.

A pumping system with suction rate of about 0.3 m^3/h within the pressure range of 10^{-0}-10^{-2} Torr was developed and tested. It also can be used as pressure-transformer for widening the measuring range of pressure meters.

2415* (German.) X-Ray Supericonoscope Microscopy. **Röntgen-Bildwandler-Mikroskopie.** Lan Yu Huang. *Zeitschrift für Physik*, v. 149, no. 2, 1957, p. 225-253.

A new method for the production of high resolution pictures with the X-ray microscope. Optics of the immersion objective; electron arrangement; course of the electron beam. X-ray source; production of ions before the anticathode. Energy distribution of the slow components of the electrons released.

See also: **1680** (solar furnace); **1755** (analytical microscopy); **2108** (process control instruments); **2276** (the lean tube for measuring flow in water); **2734** (X-ray diffraction); **2907** (temperature patterns in shielded thermocouples); **2929** (high brilliance submicrosecond light source).

LUBRICATION AND FRICTION

2416 Electrical Effects Accompanying the Stick-Slip Phenomenon of Sliding of Metals on Plastics and Lubricated Surfaces. G. W. Sohl, J. Gaynor, and S. M. Skinner. *ASME, Transactions*, v. 79, Nov. 1957, p. 1963-1970.

2417* (Russian.) Durability Increase of Ball Bearing Races. **Povyshenie stoikosti separatorov sharikopodshipnikov.** A. M. Pikovskii. *Avtomobil'naia i Traktornaia Promyshlennost'*, 1957, no. 9, Sept., p. 17-18.

Experimental and theoretical study. For increased durability, it is necessary to provide the optimum angle of contact between the ball and the cage by enlarging the sphere radius of each half-race. Durability depends also on some technological factors and methods of inspection.

2418 Chemical Analysis of the Surface Layers of Metal Exposed to Different Types of Wear. B. I. Kostetskii, N. L. Golego, and P. K. Topekha. *Henry Brutcher Translation No.* 4037, 4 p. (From *Vestnik Mashinostroeniia*, v. 36, no. 10, 1956, p. 25-26.) Henry Brutcher, Altadena, Calif.

2419* Trends in Lubrication. R. O. Campbell and S. C. M. Ambler. *Canadian Aeronautical Journal*, v. 3, Nov. 1957, p. 305-309.

A resumé of some of the past developments, present problems and possible future developments in lubrication of aviation gas turbine engines.

2420* (Russian.) Friction of Rubber in Lubricated Bearings With High Speed and Heavy Loads. **O rezhime i zakone treniia reziny pri smazke v oblasti bol'shikh skorostei i nagruzok.** A. V. Kol'chenko and A. A. Silin. *Doklady Akademii Nauk SSSR*, v. 115, no. 4, Aug. 1, 1957, p. 714-716.

Study of the friction of the axial rubber-metallic bearing used in turbine drills. Description of experiment and equipment used.

2421* (Russian.) An Experimental Study of the Friction of Rubber Within a Wide Range of Normal Pressures. **Eksperimental'noe issledovanie zakona treniia reziny v shirokom intervale normal'nykh davlenii.** V. V. Lavrent'ev. *Doklady Akademii Nauk SSSR*, v. 115, no. 4, Aug. 1, 1957, p. 717-720.

Friction of rubber on a smooth, hard surface at pressures from 1 to 200 kg. per sq. cm. was studied. Application of Thirion and Bartenev formulas.

2422* (Russian.) New Method of Production of Lime-Oil Suspension and Synthetic Grease. **Novyi sposob proizvodstva izvestkovo-maslianoi suspenzii i sinteticheskogo solidola.** V. M. Sedachev. *Khimiia i Tekhnologiia Topliva, i Masel*, 1957, no. 10, Oct., p. 72.

Method of direct preparation of oil-lime suspension agent.

2423* (Russian.) The Antifrictional Properties of the Disperse Phases of Metal Organosols. **Antifriktsionnye svoistva dispersnykh faz organozolei metallov.** M. L. Barabash and E. M. Natanson. *Kolloidnyi Zhurnal*, v. 19, no. 5, Sept.-Oct. 1957, p. 534-541.

The high efficiency of the friction pairs: steel 45 against bronze, steel 45 against globular gray cast iron, ferro-ceramics against steel 45, ferro-ceramics against globular gray cast iron, steel 45 against modified gray cast iron 38-60, and modified gray cast iron 38-60 against 38-60.

2424* Cement Mill Lubrication. *Lubrication*, v. 43, Oct. 1957, p. 113-124.

Composition of cement; additives; manufacturing processes; selection and use of suitable lubricants.

2425* Apparent Adsorption Isotherms of Oleic Acid From Hydrocarbons as Obtained From Coefficient of Friction Measurements. Arnold Miller and Arthur A. Anderson. *Lubrication Engineering*, v. 13, Oct. 1957, p. 553-556.

Boundary friction as a function of temperature of steel sliding on lead-base babbitt lubricated with various hydrocarbon solutions of surfactants was investigated with the friction pendulum. A number of dilute solutions of oleic acid in hydrocarbon were studied at 60, 80, 100, 120, and 140 C.

2426 Selecting Friction Materials. II. Elwin J. Salter. *Materials in Design Engineering*, v. 46, Nov. 1957, p. 134-137.

Resilient and metallic materials; property comparison data.

2427* Selecting Lubricants for High-Performance Ball Bearings. T. R. Rounds. *Microtecnic (English Ed.)*, v. 11, no. 4, 1957, p. 173-180.

Characteristics and uses of oils and greases.

2428* A Test for Lubricating Grease Performance Under Water-Wet Conditions. W. H. Peterson, J. B. Accinelli, and T. Skei. *NLGI Spokesman*, v. 22, no. 8, Nov. 1957, p. 18-25.

Water-wet performance of a grease requires evaluation of emulsification, work stability, corrosion, and lubrication in the presence of water. Corrosion may occur during operation of the bearing (dynamic) and not during non-operating periods (static). Dynamic corrosion is indicative of borderline lubrication.

2429* Antifriction Bearings for Kaplan Hubs. R. M. Donaldson. *Power Apparatus and Systems*, 1957, no. 32, Oct., p. 671-674.

Description and operating characteristics of bearings for large water turbine.

2430 (French.) Contribution to the Study of Friction of Lubricated Surfaces. **Contribution a l'étude du frottement lubrifié.** J. Baudry. *Revue de l'Institut Français du Pétrole et Annales des Combustibles Liquides*, v. 12, no. 9, Sept. 1957, p. 950-994.

Experiments on an engine with a view to ascertaining the relative importance of the physico-chemical and mechanical phenomena involved in the study of the coefficient of friction of

two lubricated surfaces. Results show the preponderant influence of viscosity on the friction value in all lubrication regimes whenever the speeds of displacement are no longer infinitely small.

2431 New Nonmetallic Oil Additive Reduces Engine Deposits. J. A. Miller and C. K. Parker, Jr. *SAE Journal*, v. 65, Nov. 1957, p. 38-41.

Polymeric detergents are nonmetallic additives capable of reducing drastically the deposit-forming tendencies of multigrade oils under start-stop conditions.

2432* (Romanian.) A Study of the Coefficient of Friction in a Circular Bearing, by Means of Curves $p=g$ (V). **Studiul Coeficientului de frecare într-un lagăr circula cu ajutorul carbelor $p=g$ (V).** G. Vasilca. *Studii şi Cercetări de Mecanică Aplicată*, v. 8, no. 1, Jan.-Mar. 1957, p. 75-84.

Relationships resulting from the heat equilibrium developed in a smooth circular bearing at any point of the journal bearing, operating continuously and at a constant temperature. Determining minimum friction.

2433 An Analysis of the Effect of Several Parameters on the Stability of an Air-Lubricated Hydrostatic Thrust Bearing. William H. Roudebush. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4095, Oct. 1957, 34 p. (TL570 Un3t)

Equations are developed for the motion of a gas-lubricated hydrostatic thrust bearing, and solutions are obtained on a digital computer for air as the gas. Systematic investigations are made of various parameters to determine their effect on bearing stability. Bearing pad volume and rigidity appear as prime controlling factors.

2434 Effect of Lubricant Viscosity on Rolling-Contact Fatigue Life. Thomas L. Carter. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4101, Oct. 1957, 25 p. (TL570 Un3t)

The rolling-contact fatigue spin rig was used to obtain life data for groups of steel balls lubricated with a series of paraffin-base mineral oils of varying viscosity. A continuous trend toward longer life with higher lubricant viscosity was observed. Life varied approximately as the 0.2 power of lubricant viscosity.

See also: **1735** (production of grease); **2081** (resistance of coatings to lubricants); **2474** (selection of wear-resistant materials); **2509** (corrosion protection by Li grease).

MECHANICAL ENGINEERING

2435 Instrumentation and Method for Impulse Testing of Reinforced-Concrete Beams. F. T. Mavis and M. J. Greaves. *American Society for Testing Materials, Preprint No.* 77, 1957, 5 p. (TA401 Am35p Vis.)

By means of oscilloscopes and a high-speed motion picture camera, continuous load and reaction records were superimposed on photographs taken at one millisecond intervals.

2436 Jet-Pump Theory and Performance With Fluids of High Viscosity. R. G. Cunningham. *ASME, Transactions*, v. 79, Nov. 1957, p. 1807-1820.

Theoretical relations describing the jet pump are developed in terms of dimensionless ratios and friction coefficients. In addition, an energy analysis separates friction losses and unavoidable mixing losses.

2437 Influence of Repeated Bending Loads on Biaxial Residual Stresses in Shot-Peened Plates. T. M. Elsesser. *ASME, Transactions*, v. 79, Nov. 1957, p. 1904-1910.

The plates were sectioned by etching, and curvature measurements were made to evaluate the residual-stress distributions in the region of the peened surface. Residual stresses decreased to at least 50% of their initial value in 10,200 load cycles in the medium-hard (SAE 4340) steel investigated.

2438* Basic Pneumatics for Automation. Actuation and Control of Simple Motion. I. H. L. Stewart and J. M. Moritz. *Automation*, v. 4, Nov. 1957, p. 64-69.

Advantages and disadvantages of use of compressed air; double acting cylinders; cylinder mounting.

2439* (French.) Problems of Parallel Operation of Centrifugal Pumps. **Problèmes posés par la marche des pompes en parallèle.** U. de Lachaux. *Chaleur & Industrie*, v. 38, no. 387, Oct. 1957, p. 251-264.

Study of the parameters of centrifugal pumps including head, output, and power for maximum rate of flow.

2440* How Fundamentals Are Applied to the Design of Safe, Efficient Automotive Steering Systems. Donald P. Marquis. *General Motors Engineering Journal*, v. 4, Oct.-Dec. 1957, p. 2-7.

Since the basic design of automotive steering systems has not changed, improvements in the steering system have consisted of perfecting the components, using improved materials, and redesigning system components.

2441 Handbook of Layout and Dimensioning for Production. Hyman H. Katz. 479 p. 1957. Macmillan Co., New York. (TJ230 K15h)

Gives an over-all picture of layout, detail design, and production dimensioning practices in the metal-working industries; is primarily directed to the draftsman who wants to assume more design responsibility.

2442 How to Use Digital Computers to Calculate Piping Flexibility. Tor Kolflat and K. E. Knapp. *Heating, Piping & Air Conditioning*, v. 29, Nov. 1957, p. 124-127.

2443 Recent Applications of Hydraulics to Steel Mill Drives. Charles R. Taylor. *Iron and Steel Engineer*, v. 34, Oct. 1957, p. 100-109.

Inherent advantages of rotary hydraulic drives such as variable speed with simple control, torque conversion, safe operation, simplicity, and economy offer many possibilities for useful steel plant applications.

2444* Tension of an Infinite Plate Cut Along a Circular Arc. R. C. T. Smith. *Journal of Mathematics and Physics*, v. 36, Oct. 1957, p. 223-233.

2445* (Russian.) Unsteady Turbine Shaft Vibrations in a Critical Rotation Range. **Nestatsionarnye kolebaniia vala turbiny v oblasti kriticheskikh chisel oborotov.** V. A. Grobov. *Latvijas PSR Zinātnu Akademija, Vestis*, 1957, no. 8, p. 161-172.

Study of the unsteady vibrations of the single-disc rotor of a turbine or of a centrifugal compressor having a disc in an unsymmetrical position.

2446 Selection and Application of Dynamic Seals and Packings. John B. Holt and William S. Miller. *Machine Design*, v. 29, Oct. 31, 1957, p. 69-98.

A comprehensive survey of ways and means for positive-contact sealing of moving shafts. Covers felt, radial, mechanical, and floating-ring seals; compression, molded synthetic, and leather packings.

2447 Designing Cam Profiles With Digital Computers. Hans Jeans. *Machine Design*, v. 29, Oct. 31, 1957, p. 103-106.

Recommendations on how to develop cam design equations for calculation of data with digital computers.

2448 Detecting Resonant Frequencies in Complex Structures. Russell F. Thielman. *Machine Design*, v. 29, Nov. 14, 1957, p. 149-152.

A method for determining mechanical resonance in members of a complex structure by means of phase-angles.

2449 Design in the Plastic Region. J. J. Kerley, Jr. *Machine Design*, v. 29, Nov. 14, 1957, p. 153-158.

Fundamentals of a practical technique for design of mechanical structures to withstand the action of shock and vibration.

2450 Formulas and Charts for Calculating Deflection of Circular Rings Loaded Normal to Plane of Curvature. H. D. Tabakman. *Machine Design*, v. 29, Nov. 14, 1957, p. 167-172.

2451* (Russian.) Stability of Rods and Plates Subjected to Creep. **Ustoichivost' sterzhnei i plastinok v usloviiakh polzuchesti.** Iu. N. Rabotnov and S. A. Shesterikov. *Prikladnaia Matematika i Mekhanika*, v. 21, no. 3, May-June 1957, p. 406-412.

Mathematical calculation.

2452 How to Choose Thermal Insulation. C. M. Bosworth. *Product Engineering*, v. 28, Nov. 11, 1957, p. 97-100.

Screening chart simplifies a tough design problem by organizing 25 types into three basic groups; covers main properties and uses for each.

2453 Reinforced Elliptical Holes in Stressed Plates. Raymond Hicks. *Royal Aeronautical Society, Journal*, v. 61, Oct. 1957, p. 688-693.

When the ratio of the major and minor axes of the ellipse can be chosen arbitrarily, practical reinforcements can be designed to give a maximum stress around the hole which is only slightly greater than the maximum stress in a similarly loaded plate with no hole.

2454* Hydraulic Fluids for Molding Presses. K. G. Henrikson and J. R. Hicks. *SPE Journal*, v. 13, Nov. 1957, p. 23 + 6 pages.

Hydraulic-fluid qualities required by press systems. Leakage control. Preventive maintenance.

2455* (Romanian.) A New Method of Investigation Concerning the Theory of Mechanisms and Machines. **O nouă metodă de studiu interesînd teoria mecanismelor şi a maşinilor.** D. Mangeron, C. Drăgan, and V. Svijevschi. *Studii şi Cercetări de Mecanică Aplicată*, v. 8, no. 1, Jan.-Mar. 1957, p. 51-62.

From the concept of reduced acceleration of any properly-defined order, a method was developed leading to systematic and unique solution of the problem of the accelerations of any order for plane mechanisms.

2456* (Romanian.) Transverse Deformation of a Bar Under an Axial Stress. **Asupra Deformării transversale a unei bare solicitate prin şoc axial.** E. Procopovici. *Studii şi Cercetări de Mecanică Aplicată*, v. 8, no. 1, Jan.-Mar. 1957, p. 141-154.

Dynamic behavior of bars subjected to an axial impact, based on elementary flexion theory. Solutions of some simple cases and approximate method for the general case. Study of the same phenomenon on the basis of a developed flexion theory. Shear and rotation inertia.

2457* (Romanian.) A Criterion for the Loss of Elastic Stability of Bar Systems. **Consideraţii în legătură cu un criteriu de pierdere a stabilităţii elastice a sistemelor de bare.** Mihail Ifrim. *Studii şi Cercetări de Mecanică Aplicată*, v. 8, no. 1, Jan.-Mar. 1957, p. 213-231.

Criteria for determining the minimum critical load, based on a successive approximation method. A graphic process that can also be applied to structures subjected to transverse loads.

2458* Does Vibration Affect Friction in a Bolted Joint? Richard W. Chauner and Desi D. Vasarhelyi. *Trend in Engineering (University of Washington)*, v. 9, Oct. 1957, p. 23-28.

Shows a definite relation between vibration and the value of the nominal coefficient of friction at the beginning of slip.

2459* (German.) Elastic-Plastic Bending of Non-Homogenous Orthotropic Circular Plates. **Elasto-plastische Biegung von nicht-homogenen orthotropen Kreisplatten.** W. Olszak and J. Murzewski. *Zeitschrift für Angewandte Mathematik und Mechanik*, v. 37, July-Aug. 1957, p. 277-278.

Mathematical analysis.

See also: **1561** (stall in axial compressors); **2480** (materials for gears); **2904** (thermal stresses in semi-plastic cylinder).

METALLURGY

2460 Radiation Stability Studies on Binary Uranium Alloys. G. D. Calkins, J. E. Gates, A. A. Bauer, and F. A. Rough. Paper from "Advances in Nuclear Engineering". v. II. Pergamon Press. 1957. p. 272-281. (TK9006 N88 Over.)

A screening study covering 5, 7, and 10 wt. % Mo-U, 3, 5, 10, and 15 wt. % Zr-U, and 4.5 wt. % Cr-U alloys indicated that the U-10 wt. % Mo alloy, when irradiated in the retained-γ condition, possesses the greatest radiation stability. In general, radiation stability increases with alloy content. Heat treatment has a marked effect.

2461 Manufacture of Fuel Plates for the Experimental Boiling Water Reactor. R. E. Macherey, C. H. Bean, N. J. Carson, Jr., and J. R. Lindgren. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5629, June 1957, 249 p. (UF767 Un3.1ah Contin.)

Production of U alloy containing 5 w/o Zr and 1.5 w/o Nb. Fabrication of the cladding components from Zircaloy-2 ingot; assembly, welding, evacuation, and sealing of the cladding billets; jacketing of the cladding billets with steel; roll bonding, heat treatment, stripping, and cleaning of the fuel plates.

2462* (German and French.) Applications of Radioactivity in the Light Metal Industry. **Anwendungen der Radioaktivität in der Leichtmetallindustrie.** F. Rohner. *Aluminium Suisse*, v. 7, no. 5, Sept. 1957, p. 174-181.

Application of radioactive tracers to radio, photography, nondestructive testing, study of wear, and analysis by activation. Use of radioisotopes in modern metallurgy.

2463 Basic Metallurgy. G. William Zuspan, editor. v. II. 332 p. 1957. American Society for Metals, Cleveland. (TN665 Am35b)

A laboratory text designed to familiarize students with metallurgical equipment, tests, and techniques.

2464 High-Strength Materials for Pressurized-Water In-Pile Tubes. Ward F. Simmons, Walter K. Boyd, Raeman P. Sopher, and Fred H. Lyon. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-1224, Sept. 1957, 54 p. (UF767 U3b Contin.)

It is recommended that further research be confined to Inconel X, hot rolled and aged; AM-350, subzero cooled and tempered; and Discaloy, solution treated and aged.

2465 Effect of Vacuum Melting on the Growth of Gray Iron. F. N. Tavadze and I. A. Bairamashvili. *Henry Brutcher Translation No.* 4038, 5 p. (From *Liteinoe Proizvodstvo*, 1955, no. 12, Dec., p. 23.) Henry Brutcher, Altadena, Calif.

Linear growth and scaling resistance of gray iron before and after vacuum melting as function of time of holding at 730 C. Changes in microstructures after vacuum treatment.

2466 Columbium (Niobium) and Tantalum. R. J. Jones. *Canada, Department of Mines and Technical Surveys, Mines Branch Memorandum Series No.* 135, 1957, 56 p. (TN26 C16.5m Vis.)

History; world mine production; extraction and metallurgy; consumption and use.

2467* (German.) Mysterious Cobalt. **Geheimnisvolles Cobalt.** Wilhelm von Haken. *Chemische Industrie*, v. 9, no. 3, Sept. 1957, p. 429-434.

Properties and industrial uses. Countries of origin and markets.

2468* (Russian.) Experience at the "Cheliabenergo" Metals and Welding Laboratory. **Opyt raboty laboratorii metallov i svarki Cheliabenergo.** E. I. Krutasova. *Energetik*, v. 5, no. 10, Oct. 1957, p. 4-7.

Laboratory testing of boiler steam pipes made from 12MX steel (carbide analysis, mechanical testing, microscopy, γ-ray examinations, and others) in order to study metal behavior at operating conditions of 510 C and 110 atm. pressure.

2469* (Russian.) Heat-Resisting Materials Used for Machine Construction in the Power Industry. **Zharoprochnye materialy dlia energomashinostroeniia.** L. A. Glikman, A. V. Staniukovich, and A. I. Chizhik. *Energomashinostroenie*, v. 3, no. 11, Nov. 1957, p. 22-26.

Review of various types of heat-resistant steels and their properties. Kinetics of fracture processes at continuous loads; kinetics of changes of structure and properties caused by continuous action of elevated temperatures.

2470* (Polish.) The Problem of Transformer Steelmaking. **Zagadnienia wytapiania stali transformatorowej.** M. Stankiewicz. *Hutnik*, v. 24, nos. 7-8, July-Aug. 1957, p. 266-271.

Chemical composition of transformer steel and effects of the individual elements on the magnetic properties. The problems of non-metallic inclusions. Qualities of ferrosilicates. Methods used with electric and Martin furnaces.

2471 Molybdenum—A Versatile Metal. G. L. Miller. *Industrial Chemist*, v. 33, Oct. 1957, p. 509-518.

Occurrence, properties, and production; applications in iron and steel, catalysis, fertilizers, pigments, and lubricants.

2472* The Application of Radioactive Tracers to Surface Studies. R. W. Cahn. *Institute of Metal Finishing, Bulletin*, v. 7, Autumn 1957, p. 1-12.

Radioactive isotopes and their measurement; ionic exchange between metal and electrolyte; application of tracers in studying electrodeposition, adsorption, corrosion, and friction.

2473 (French.) Results of Transformation Tests Conducted on "BTM" Open-Hearth Steel Prepared by Means of Oxygen Enriched Air. **Résultats des essais de transformation d'acier Thomas BTM élaboré au moyen d'air enrichi en oxygène.** M. Thiault and J. Stremsdoerfer. *Institut de Recherches de la Sidérurgie, Publications*, ser. A, no. 170, Sept. 1957, 107 p. (TN602 In7p Vis.)

Production of 310 tons of open-hearth steel with low metalloid content into rolled strips and thin sheets for car bodies and enameling. Studies on products made with small round bar steel and machine wire.

2474 A New Way to Select Wear-Resistant Materials. J. R. Driear. *Iron Age*, v. 180, Nov. 21, 1957, p. 121-124.

Wear applications can be classified according to stress and lubrication conditions. The experience of others is valuable in initial selection of materials for a particular job.

2475 Copper-Base Alloy Compares With Nickel Silver. C. H. Hannon. *Iron Age*, v. 180, Nov. 21, 1957, p. 134-136.

Certain Cu-base alloys, modified with Zn or Al, make an effective substitute for 18% Ni-silver at operating temperatures up to 1000 F.

2476 Sand Cast Magnesium-Rare Earth Metal-Zirconium Alloys. T. E. Leontis and D. H. Feisel. *Journal of Metals*, v. 9, sec. 2; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Oct. 1957, p. 1245-1252.

Addition of Zr to cast Mg-rare earth metal alloys results in a marked degree of grain refinement and a significant improvement in strength and ductility at temperatures up to 400 F. The strength properties and creep resistance of Mg didymium Zr alloys are markedly superior to those of Mg misch metal Zr alloys.

2477 Some Properties of Zirconium-Niobium Alloys. Iu. F. Bichkov, A. N. Rozanov, and D. M. Skorov. *Journal of Nuclear Energy*, v. 5, nos. 3-4, 1957, p. 402-407. (Translated from *Atomnaia Energiia*, v. 2, 1957, p. 146.)

Equilibrium diagram; mechanical properties; hot-strength; resistance to oxidation.

2478* (Russian.) Actual Problems in Metallography and Heat Treatment of Cast Iron. **Aktual'nye voprosy metallovedeniia i termicheskoi obrabotki chuguna.** A. F. Landa. *Liteinoe Proizvodstvo*, 1957, no. 10, Oct., p. 13-15.

Considers such problems as alloying, calorizing, isothermal treatment, and others. Description of a new method of cooling alloys in a "pseudoliquid" medium.

2479 Three Manganese Alloys Have Useful Thermal and Elastic Properties. John L. Everhart. *Materials in Design Engineering*, v. 46, Nov. 1957, p. 144-146.

Ternary alloys containing 50% Mn, 45% Fe, and 5% Al, Co, or Ni; Mn-Cu alloys containing 60 to 80% Mn; Mn-Ni-Cu alloys containing 60 to 80% Mn and 10 to 20% Ni.

2480 Materials for Gears. Norman E. Woldman. *Materials in Design Engineering*, v. 46, Nov. 1957, p. 149-164.

Selection factors; properties of various ferrous, bronze, and nonmetallic materials, and metal powders.

2481 Radiation and Metals. A. E. Williams. *Metal Industry*, v. 91, Oct. 25, 1957, p. 359-362.

X-rays and radioisotopes; effects. Porous metal coatings. Thickness gages.

2482 The Metallurgy of EBWR. Karl F. Smith. *Metal Progress*, v. 72, Nov. 1957, p. 79-83.

New alloys for solving metallurgical problems; fabrication of fuel elements; the pressure vessel; high absorptive components; supports and other structural materials.

2483 Alloys for Precious Metal Jewelry. Ralph H. Atkinson. *Metal Progress*, v. 72, Nov. 1957, p. 107-111.

Composition and mechanical properties. Commercial standards and stamping laws.

2484 Precipitation Hardening Stainless Steels. Allen C. Gilbraith. *Metal Treatment and Drop Forging*, v. 24, Oct. 1957, p. 395-399.

Composition, structure, properties, and heat-treatment of three new high-strength aircraft steels.

2485* Plutonium and Its Alloys. K. Q. Bagley. *Nuclear Engineering*, v. 2, Nov. 1957, p. 461-468 + 4 plates.

Occurrence and availability; extraction; nuclear, physical, and mechanical properties; compatibility; fabrication and handling; reactor conditions.

2486 Nuclear Metallurgy. v. IV. A Symposium on Uranium and Uranium Dioxide. 143 p. 1957. American Institute of Mining, Metallurgical, and Petroleum Engineers, New York. (TN697 Am35n4)

Melting, casting, forging, rolling, coldworking, and welding of U; preparation and fabrication of UO_2 for fuel element use.

2487 Boron-Aluminum and Boron-Uranium-Aluminum Alloys for Reactor Application. W. C. Thurber, J. A. Milko, and R. J. Beaver. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2149, Oct. 1957, 23 p. (UF767 U3o Contin.)

Conventional air induction melting techniques, using graphite crucibles and slab-shaped molds, can be successfully employed in the preparation of B-Al and B-U-Al alloys containing 0.02 to 0.4 wt.% B. Casting variables, corrosion resistance, microstructure, and mechanical properties were studied.

2488 (German.) Cast Art Works of About 1800. **Der Eisenkunstguss um 1800.** Sigrid Theisen. *Stahl und Eisen*, v. 77, no. 21, Oct. 17, 1957, p. 1499-1505.

Historical survey.

2489* (Russian.) Research Work in the Field of Development of New Grades of Steel and Alloys; Metallography and Heat-Treatment. **Raboty v oblasti izyskaniia novykh stalei i splavov, metallovedeniia i termicheskoi obrabotki.** M. V. Pridantsev. *Stal'*, v. 17, no. 11, Nov. 1957, p. 1006-1010 + 1 plate.

Methods of improving the existing grades of steel and alloys, and the need for new ones. Research at several Soviet metallurgical institutions in the development of new grades of steel and alloys.

2490 Trends in Metals: Stainless Steels. *Steel*, v. 141, Nov. 4, 1957, p. 107-122.

Trends in application, design, and fabrication. Producers and what they make. Survey of what stainless users are doing today and planning for tomorrow.

2491 Titanium, A Materials Survey. Jesse A. Miller. *U. S. Bureau of Mines, Information Circular* 7791, Sept. 1957, 202 p. (TN21 Un3i)

Consumption, properties, and uses; mineralogy and geology of Ti deposits; resources; prospecting, mining, and beneficiation; processing; fabrication; structure of the industry; supply and distribution; marketing; prices; research; public policy and national defense; selected bibliography.

2492 Performance of Inconel 550 Turbine Blades in a Turbojet Engine and Effects of Different Forging Temperatures and Heat Treatments. C. A. Gyorgak, J. R. Johnston, and J. W. Weeton. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* E55F08, Aug. 1955, 55 p. (TL782 Un3rm Vis.)

2493* (German.) Survey of Methods of Steel Production and of the Alloy Steels. **Übersicht über die Stahlerzeugungsverfahren und die legierten Stähle.** Franz Sommer. *VDI Zeitschrift*, v. 99, no. 30, Oct. 1957, p. 1517-1525.

Description of Thomas, open-hearth, electric, Linz-Donawitz, and rotory processes. Physical and chemical structure of carbon and alloy steels.

See also: **2105** (automation in steel plants); **2256** (steel plant cost accounting); **2443** (hydraulic drives in steel mills); **2522** (corrosion-resisting alloys).

METALS—CORROSION

2494* (Spanish.) Intercrystalline Corrosion, Called "Caustic Cracking", in Steam Boilers. **La corrosión intercristalina, ilamada "fragilidad cáustica", en las calderas de vapor.** Manuel Adroer Iglesias and José M. Hausmann Moro. *Acero y Energia*, v. 14, July-Aug. 1957, p. 35 + 14 pages.

Historical background of caustic cracking. Description of the cracks. Location and identification. Use of a Schroeder detector. Inhibition of the phenomenon. Chemical inhibitors: Na_2SO_4, Na_3PO_4, $NaNO_3$, and tannins. Analytical methods.

2495 Fretting Fatigue Strength of Titanium Alloy RC 130B. H. W. Liu, H. T. Corten, and G. M. Sinclair. *American Society for Testing Materials, Preprint No. 66*, 1957, 19 p. (TA401 Am35p Vis.)

The mechanism responsible for fretting fatigue damage appears to be the repeated frictional shear stress on the contacted asperities of the specimen surface. A mathematical expression was derived which relates the fretting fatigue strength to the fatigue limit of the specimen material, the hardness of the gripping pad, and the coefficient of friction.

2496* Corrosion and Tuberculation of Cast Iron. Thurston E. Larson and R. V. Skold. *American Water Works Association, Journal*, v. 49, Oct. 1957, p. 1294-1302.

Calcium in the presence of alkalinity, regardless of pH or saturation index, is an effective inhibitor to corrosion in water pipes. The problem of designing water treatment to avoid tuberculation is limited to such waters as already contain inhibitors in insufficient concentrations to provide complete protection. A rate of flow sufficient to transport the inhibitor to the point of effectiveness is also necessary.

2497 Corrosion of an Aluminum-Nickel Alloy in a Reactor Test Loop. Emil Louis Martinec. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5783, Sept. 1957, 18 p. (UF767 Un3.1an Contin.)

Various Al-Ni alloys were tested under conditions simulating reactor operation.

2498 Stress-Corrosion Cracking of Insulated Austenitic Stainless Steel. A. W. Dana, Jr. *ASTM Bulletin*, 1957, no. 225, Oct., p. TP196-TP202.

Cracking on exposure to moist thermal insulating materials is believed to result from the action of water-soluble chlorides leached from the insulations. The 85% magnesia insulation had the greatest tendency to produce cracking at 100 C.

2499 (French.) The Magnetic Treatment of Liquids Against Corrosion and Incrustation. **Le traitement magnétique des liquides contre la corrosion et l'incrustation.** Théo Vermeiren. *Centre Belge d'Étude de la Corrosion, Rapport Technique*, no. 54, Sept. 1957, 16 p. (TA462 C33r Vis.)

Magnetic fields and the corrosion and incrustation phenomena. Construction of treatment apparatus. Causes of failure. Chemical effects of the treatment. Checking its effectiveness. Applications.

2500 Corrosion and Its Manifestations. Mars G. Fontana. *Chemical Engineering Progress*, v. 53, Nov. 1957, p. 525-530.

An introduction to the various types of corrosion, and practical means for protection against corrosive attack.

2501* Corrosion in Chemical Engineering: Zirconium and Tantalum. G. L. Miller. *Chemical & Process Engineering*, v. 38, Oct. 1957, p. 389-390.

Potentialities of Zr and Ta as corrosion resistant materials.

2502* Aluminium v. Corrosion by Water. E. W. Jackson. *Chemical & Process Engineering*, v. 38, Oct. 1957, p. 391-393.

Surveys data on the action of water on Al under various conditions and raises some points concerning the design of Al plant and equipment for such conditions.

2503* (French.) Rapid Evaluation of the Degree of Passivity of Stainless Steels by Means of a Constant Intensity Potentiometric Method. **Sur l'évaluation rapide du degré de passivité des aciers inoxydables à l'aide d'une méthode potentiométrique à intensité constante.** Philippe Berge. *Comptes Rendus*, v. 245, Oct. 7, 1957, p. 1239-1241.

The degree of passivity was evaluated in a few minutes by means of electrochemical reduction of the film responsible for the passivity of ferritic and austenitic stainless steels. Application to an 18/8 steel after surface treatment and to nondestructive tests.

2504 Factors Other Than Mineral Content Which Influence the Corrosiveness of Cooling Water. E. H. Hurst. *Corrosion*, v. 13, Nov. 1957, p. 696t-700t.

These factors include microbiological activity, silt and debris, suspended solids, dissimilar metals, and hydrocarbon pollution. Data show the effect of summer and winter slime on corrosion rates in the presence of an inhibitor.

2505 Some Experiences With Sodium Silicate as a Corrosion Inhibitor in Industrial Cooling Waters. J. W. Wood, J. S. Beecher, and P. S. Laurence. *Corrosion*, v. 13, Nov. 1957, p. 719t-724t.

Crystalloidal silica is highly effective in stopping corrosion of mild steel by a wide variety of industrial cooling waters. Magnesium hardness in concentrations above 250 p.p.m. as $CaCO_3$ greatly reduces the inhibitive action.

2506 Corrosion and Adsorption Studies Using Sulfonate Inhibitors. A. H. Roebuck, P. L. Gant, O. L. Riggs, and J. D. Sudbury. *Corrosion*, v. 13, Nov. 1957, p. 733t-738t.

Radiometric adsorption and desorption studies of sodium and amine salts of sulfonic acids. Corrosion inhibitor studies of these salts in H_2S and CO_2 environments. A simplified explanation of the mechanism of sulfonate inhibitors.

2507 An Evaluation of Inhibitors for Corrosion Prevention in an Engine Cooling System. Leonard C. Rowe. *Corrosion*, v. 13, Nov. 1957, p. 750t-756t.

A rotating specimen test is used to evaluate sodium borate, sodium nitrite, sodium benzoate, potassium dichromate, soluble oil, and sodium mercaptobenzothiazole as inhibitors. The metals investigated are steel, Cu, brass, Al, cast iron, and solder.

2508* (French.) Corrosion Phenomena of Tubular Condensers. Characteristic Examples. Prevention and Correction. **Les phénomènes de corrosion des condenseurs tubulaires. Quelques exemples caractéristiques. Remèdes préventifs et curatifs.** A. J. Maurin. *Corrosion et Anticorrosion*, v. 5, no. 10, Oct. 1957, p. 275-285.

Description and use of a tubular condenser. Cathodic protection. Chlorination. General rules to prevent corrosion.

2509* Corrosion Engineering Research. I. Improved Lithium-Based Multi-Purpose Greases. II. The Corrosive Action of Soluble Cutting Oils. *Corrosion Prevention and Control*, v. 4, Oct. 1957, p. 53-56.

2510* Fretting Corrosion as an Engineering Problem. K. H. R. Wright. *Corrosion Prevention & Control*, v. 4, Nov. 1957, p. 37-44.

Characteristics and mechanism of fretting corrosion; surface treatments and lubrication as remedial measures; fatigue.

2511* (Russian.) Passivation and Depassivation of a Pb Anode in Concentrated Hydrofluosilicic, Perchloric, and Hydrofluoboric Acids. **Passivatsiia i depassivatsiia svirtsovogo anoda v kontsentrirovannykh kremneftoristovodorodnoi khlornoi i boroftoristovodorodnoi kislotakh.** M. M. Nikiforova and Z. A. Iofa. *Doklady Akademii Nauk SSSR*, v. 115, no. 6, Aug. 21, 1957, p. 1131-1134.

2512* (German.) A Contribution to the Explanation of Corrosion in Cooling Tubes. **Beitrag zur Klärung der Korrosion von Kühlerrohren.** A. Wyszomirski, H. Rüdiger, E. Bachran, and O. Damm. *Energietechnik*, v. 7, no. 9, Sept. 1957, p. 403-412.

Sheet-like corrosion and pitting of water tubes in industry. Properties of the cooling water used in testing water between 50 to 60 C during 248 days. Incrustation.

2513* (German.) Electrolytic Corrosion in Condenser Tubes of a Condensation Turbine. **Zerstörungen an Kondensatorrohren einer Kondensationsturbine durch elektrolytische Korrosionen.** F. E. Sell. *Energietechnik*, v. 7, no. 9, Sept. 1957, p. 413-417.

Material and construction of the condenser. Spectral and quantitative examination of tubes composed of 71.8% Cu, 27.5% Zn, and 1.05 Sn. Electrolysis by stray currents; physical and electrical phenomena caused by local elements. Preventive measures.

2514* (Russian.) Investigation of Corrosion Cracking of Steam Turbine Disks. **Issledovanie korrozionnogo rastreskivaniia diskov parovykh turbin.** V. M. Nikiforova and N. A. Reshetkina. *Energomashinostroenie*, v. 3, no. 10, Oct. 1957, p. 19-22.

Shows that the basic cause of disk fracture is corrosion cracking resulting from simultaneous influence of alkali salts and high working stresses in the metal.

2515* (German.) Localization of Corrosion Damage in Underground Pipes. **Lokalisierung von Korrosionsschäden an erdverlegten Rohrleitungen.** Heinrich Klas and Gerhard Heim. *Gas- und Wasserfach*, v. 98, Ausgabe Wasser, no. 44, Oct. 31, 1957, p. 1103-1106.

Measurements of the specific ground resistance at various depths according to the Wenner-process, whereby the ground conductivity, the dispersion rate of sediments, the conditions of precipitation, and the permeability of the ground for air and water are analyzed.

2516 Uniform Aqueous Corrosion of Aluminum—Effects of Various Ions. V. H. Troutner. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-50133, June 1957, 53 p. (UF767 Un3.1hw Contin.)

Results of a study designed to provide a comprehensive survey of the effects of various ions and combinations of ions, to distinguish between ion effects and pH effects, and to determine the suitability of short term corrosion tests at atmospheric pressure for investigating aqueous corrosive media.

2517* (Polish.) Resistance to Intercrystalline Corrosion of Welded Joints of Unstabilized 18-8 Steel. **Odporność na korozję międzykrystaliczna połczeń spawanych z niestabilizowanych stali typu 18-8.** Józef Nemec. *Hutnik*, v. 24, no. 9, Sept. 1957, p. 356-363.

Effect of additional water cooling during steel welding. Importance of reduction of intercrystalline corrosion in steel without Mo and with 0.08 to 0.10% of C.

2518* **Organic Corrosion Inhibitors for Iron.** Robert Jenny. *Industrial Finishing (London)*, v. 9, Oct. 1957, p. 872 + 4 pages.

Studies with liquid and insoluble mercaptans of different structures.

2519 (French.) A Study of the Formation of Oxide Scales on Billets. **Étude du calaminage de billettes.** J. Moreau and M. Cagnet. *Institut de Recherches de la Sidérurgie, Publications*, ser. A, no. 164, Aug. 1957, 23 p. (Reprinted from *Revue de Métallurgie*, v. 54, no. 5, May 1957, p. 383-403.) (TN602 In7p Vis.)

Effects of the heating time, temperature, and furnace atmosphere on the total scale layer, the depth of contamination, and the decarburization. Influence of steel quality on rate of scale formation. Semi-hard and extra soft steels were used.

2520 Dimensional Changes Resulting From Dezincification of Alpha Brass. W. J. Cooley and D. D. Van Horn. *Journal of Applied Physics*, v. 28, Nov. 1957, p. 1292-1297.

Dimensional changes were directly proportional to the amount of Zn removed and were independent of the temperature. They are explained as a combination of a net loss of lattice sites from the sample and the substitution of vacancies for Zn atoms at some of the other lattice sites.

2521* (Russian.) Electrode Potentials and Rate of Copper Oxidation in Sulfuric and Hydrochloric Acid Solutions. **Elektrodnye potentsialy i skorost' okisleniia medi v rastvorakh sernoi i solianoi kislot.** V. M. Kadek and L. K. Lepin'. *Latvijas PSR Zinâtnu Akademija, Vestis*, 1957, no. 8, p. 129-136.

Corrosion studies in 0.01, 0.1, 1.0, and 2.0 N solutions. Weight increase was 8 mg/dm² per hr. in 1 N HCl and 3.66 mg/dm² per hr. in 1 N H_2CO_4. Cu^{++} ions showed a depolarizing effect.

2522 Corrosion Resistant Materials—Metals and Alloys. Lester F. Spencer. *Metal Finishing*, v. 55, Nov. 1957, p. 62-68.

Pertinent data on stainless steels, Ni, Ni-base alloys, and other materials.

2523* (Russian.) Corrosion-Resistance of Metals for Hydro-Turbine Parts. **Korrozionnaia stoikost' metallov dlia detalei gidroturbin.** M. G. Timerbulatov. *Metallovedenie i Obrabotka Metallov*, 1957, no. 10, Oct., p. 12-18.

Methods and results of investigation of corrosion resistance of stainless and other steels; of 18DGSL steel after various heat-treatments and with Ni and P additions; of specimens from different sections of large vanes made from 20GSL steel; industrial and laboratory castings from 20Kh13NL stainless steel; of high-strength cast iron with nodular graphite and its welded joints.

2524 The Scaling of Billets. II. J. Moreau and M. Cagnet. *Metal Treatment and Drop Forging*, v. 24, Oct. 1957, p. 407-415.

Structure and composition of scales. Kinetic study of the oxidation in air of four steels. (To be concluded.)

2525 New Gasoline Rust Inhibitor. Robert M. Pines and John D. Spivack. *Petroleum Engineer (Management Ed.)*, v. 29, Nov. 1957, p. C18-C20.

N-Oleoyl sarcosine protects tanker bulkheads, pipelines, and tanks.

2526* (French.) Optical Studies of the Corrosion of Silver by Iodine Vapor. **Études optiques de la corrosion de l'argent par la vapeur d'iode.** G. Colange and R. Dubrisay. *Société Chimique de France, Bulletin*, 1957, no. 10, Oct., p. 1225-1228.

Interference methods, using a continuous recording apparatus, were used to study variation of the velocity of attack with temperature and depth of attack.

2527 Scaling of Zirconium and Zirconium Alloys. J. A. Burka, C. S. Crouse, and R. E. Swift. *University of Kentucky (U. S. Atomic Energy Commission)*, AECU-3661, Aug. 1957, 40 p. (UF767 U3au Contin.)

The alloys were tested for scaling resistance at 1200, 1500, and 1800 F for periods up to about 300 hrs. Scaling propensity of the alloys was evaluated on the basis of the weight increase per unit area as compared to that of unalloyed Zr.

2528 Oxide Coatings on Aluminum Wire. A. A. Defoe. *Wire and Wire Products*, v. 32, Nov. 1957, p. 1341 + 5 pages.

Formation of natural oxide film; composition and properties; anodizing; uses for anodized wire.

2529* (Russian.) A New Photographic Method for Investigating the Corrosion of Metals in the Early Stages. **Novyi fotograficheskii metod issledovaniia atmosfernoi korrozii metallov v rannei stadii.** I. L. Roikh. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 9, Sept. 1957, p. 1959-1963.

Automatic method using continuous cleansing was developed for studying atmospheric corrosion during the first few sec. from the beginning of the oxidation.

2530* (Russian.) Oxidation of Nickel in Sulfur Dioxide at High Temperatures. **Okislenie nikelia v sernistom gaze pri vysokikh temperaturakh.** V. V. Ipat'ev and D. V. Zheltukhin. *Zhurnal Prikladnoi Khimii*, v. 30, no. 9, Sept. 1957, p. 1281-1286.

Kinetics of Ni oxidation in SO_2 at 600 to 800 C; investigation of phase and chemical composition of the scale.

2531* (Russian.) Maximum Cathode Current Density and the Rate of Corrosion of Copper in Nitric Acid Solutions. **Predel'naia katodnaia plotnost' toka i skorost' korrozii medi v rastvorakh azotnoi kisloty.** I. V. Oknin. *Zhurnal Prikladnoi Khimii*, v. 30, no. 9, Sept. 1957, p. 1330-1339.

Comparison of the maximum cathode current density, measured on a flat Pt electrode, and the rate of Cu corrosion in HNO_3 solutions at 25, 60, and 90 C.

See also: **1716** (cathodic protection of chemical plants); **2053** (alkaline corrosion of vitreous enamels); **2055** (corrosion of Fe); **2153** (corrosion resistance of electrolytic Pb-Ni alloy); **2367** (scale formation in boilers); **2428** (corrosion of bearings); **2833** (attack of U-Nb alloys by molten U alloys); **3037** (corrosion inhibitors for airconditioning cooling waters).

METALS—EXTRACTION AND REFINING

2532 The Addition of Pulverized Calcitic Limestone to Magnetite Concentrates and Its Beneficial Effects on Improved Sinter Quality and Increased Blast Furnace Production. R. K. Glass. *American Iron and Steel Institute, Preprint,* 1957, 20 p. (TS300 Am35ta Vis.)

2533 Bottom Practice at Number One Open Hearth. R. M. Jordan. *American Iron and Steel Institute, Preprint,* 1957, 11 p. (TS300 Am35ta Vis.)

Practices followed in reducing bottom delays.

2534 The Development of Optimum Ingot Sizes for Flat Rolled Products. J. G. Sibakin. *American Iron and Steel Institute, Preprint,* 1957, 36 p. (TS300 Am35ta Vis.)

Mathematical analysis of operations of the hot strip mill can be the basis for establishment of conditions for the physical balance of the mill and for the selection of optimum slab sizes for a given mill. On this basis, optimum ingot sizes can be developed from the point of view of the best possible rolling practices, metallurgical temperature considerations, and open hearth practices.

2535 Furnace Lines, Operating Methods and Theory of Southern and Northern Blast Furnace Practice. John R. Hunt. *American Iron and Steel Institute, Preprint,* 1957, 36 p. (TS300 Am35ta Vis.)

2536 Investigations and Controls of Open Hearth Production Problems. A. V. Lang and T. A. Cleary, Jr. *American Iron and Steel Institute, Preprint,* 1957, 17 p. (TS300 Am35ta Vis.)

Application of statistical methods to the investigation and control of basic open hearth production rates.

2537 New Trends in Firing Practices for Open Hearth Furnaces. James E. Goodin. *American Iron and Steel Institute, Preprint,* 1957, 6 p. (TS300 Am35ta Vis.)

2538 Pneumatic Processes of Steel Ingot Production in Europe and North America. Gordon M. Yocom. *American Iron and Steel Institute, Preprint,* 1957, 80 p. (TS300 Am35ta Vis.)

Details of the acid and basic Bessemer, basic oxygen, and Kaldo processes in various countries.

2539 Processes for Direct Reduction of Iron. Bruce S. Old. *American Iron and Steel Institute, Preprint,* 1957, 22 p. (TS300 Am35ta Vis.)

Brief descriptions of five major processes in the U. S.

2540* (German.) Investigations on the Rapidity of Separation of Primary Deoxidation Products From Molten Iron. **Untersuchungen über die Abscheidungsgeschwindigkeit primärer Desoxydationsprodukte aus Eisenschmelzen.** Wilhelm Anton Fischer and Manfred Pahlster. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 601-609.

Balance between iron, atmosphere, and crucible preparations of magnesia, corundum, silica, lime, and lime with 15 to 20% fluorite. Relationship between separation time and Si additions, temperature, and furnace size.

2541* (German.) Contribution to the Measurement of the Crown Temperature of Open Hearth Furnaces by Electrical Means. **Beitrag zur Gewölbetemperaturmessung von Siemens-Martin-Öfen auf thermoelektrischem Wage.** Hans-Joachim Kirschning, Emil Hochstrate, and Hermann Rodrian. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 611-614.

Distribution of heat in the open-hearth furnace according to the crown temperature. Replacing optical temperature measurement by thermoelectric equipment.

2542 Production of Metallic Lithium on a Laboratory Scale Under Reduced Pressure. T. Szarowicz and M. Orman. *Henry Brutcher Translation No.* 3601, 11 p. (Abridged from *Prace IMH,* v. 7, nos. 5-6, 1955, p. 270-275.) Henry Brutcher, Altadena, Calif.

2543 New Method of Studying Equilibria in Metal-Slag Systems. V. F. Surov, O. V. Travin, and L. A. Shvartsman. *Henry Brutcher Translation No.* 3933, 8 p. (From "Problems of Metallography and Metal Physics", Fourth Collection of Papers. State Sci. & Techn. Publishing House for Ferrous and NF Literature. Moscow, 1955, p. 616-620.) Henry Brutcher, Altadena, Calif.

Method for determining desulfurizing and dephosphorizing power of slags over a wide range of compositions.

2544 Pouring of Steel Ingots With Electric Arc Heating of Their Heads. B. N. Popov. *Henry Brutcher Translation No.* 4029, 8 p. (Abridged from *Metallurg,* v. 1, no. 9, 1956, p. 19-22.) Henry Brutcher, Altadena, Calif.

Electric arc heating of the heads of steel ingots constitutes an effective means of increasing the ingot yield and lowering production costs.

2545 Effect of Ultrasound on Structure and Properties of Steel Ingots. Ia. B. Gurevich, V. I. Leontov, and I. I. Teumin. *Henry Brutcher Translation No.* 4035, 10 p. (From *Stal',* v. 17, no. 5, 1957, p. 406-411.) Henry Brutcher, Altadena, Calif.

Laboratory-scale treatment of solidifying ingots with ultrasound considerably improved the macro and microstructures, mechanical properties, and workability of the solidified metal.

2546* (German.) Production of Iron and Steel by Means of Electricity. **Elektrische Eisen- und Stahlgewinnung.** H. Walde and B. Marincek. *Elektrowärme,* v. 15, Oct. 1957, p. 355-360.

The electric low-shaft furnace and the electric arc furnace are compared with conventional production methods. Economic data.

2547* (Polish.) Self-Fluxing Sinter. **Spiek samotopliwy.** Eugeniusz Mazanek and Ryszard Benesch. *Hutnik,* v. 24, no. 5, May 1957, p. 181-186.

Use of self-fluxed sinter as batch material in the blast furnace process. Sinter is easily reducible, shortens the time the ore has a pasty consistency during slag formation, and permits economical use of even very poor ores.

2548* (Polish.) Present Problems in Technical Manganese Production. **Aktualne problemy technologii otrzymywanie manganu.** Jacek Dembowski and Antoni Riesenkampf. *Hutnik,* v. 24, no. 5, May 1957, p. 192-197.

Production of Mn from poor ores by the metallurgical, electrolytic, or chemical method. Recovery of Mn from Martin slag.

2549 The Removal of Lead From Copper in Fire Refining. J. E. Stolarczyk, A. Cibula, P. Gregory, and R. W. Ruddle. *Institute of Metals, Journal,* v. 86, Oct. 1957, p. 49-58.

A new phosphate treatment was developed in which additions of phosphor-copper are made to the oxidized Cu melt in the ratio of approximately two parts of P to one part of Pb to be removed; the Pb is precipitated in the melt as globules of Cu-Pb phosphate which quickly rise to the surface of the bath. The Cu lost in the phosphate slag is approximately 1 to 1½% of the bath weight.

2550 (French.) Tests of the Control and Regulation of the Open-Hearth Furnace. Study of the Factors Influencing Its Operation. **Essais sur le controle et la régulation des fours martin. Étude des facteurs agissant sur leur marche.** R. Alleyrac, R. Ferry, L. Septier, Hoang Chan, and M. Faure. *Institut de Recherches de la Sidérurgie, Publications,* ser. A, no. 167, Aug. 1957, 127 p. (TN602 In7p Vis.)

Tests with control apparatus and lean gas-heated 70-ton furnaces permitted determination of the optimum operating conditions, and effected an actual 5 to 10% improvement of furnace productivity without added fuel consumption.

2551 (French.) Operating Different Types of Cowper Apparatus as Heat Accumulators. **Exploitation de divers types d'appareils Cowper en accumulateurs de chaleur.** D. Sanna and M. Pasquet. *Institut de Recherches de la Sidérurgie, Publications,* ser. A, no. 130, Oct. 1957, 67 p. (Reprinted from

Documentation Métallurgique, Aug. 15, 1956, p. 17-67.) (TN 602 In7p Vis.)

Problems of heat accumulation. Installation and safety. Creep of silico-alumina bricks. Properties of the Cowpers and of their honeycomb sections. Determination of the amount of heat accumulated. The possibilities of accumulation.

2552 Vacuum Stream Degassing Is New Tool for Steel Plant Engineers. K. C. Taylor. *Iron and Steel Engineer*, v. 34, Oct. 1957, p. 142 + 1 page.

Equipment now in operation demonstrates that vacuum pouring is the most economical and dependable way to reduce and control gaseous inclusions in steel.

2553* (Russian.) Sources of Steel Contamination by Oxide Inclusions During Tapping and Pouring. **Istochniki zagriazneniia stali oksidnymi vkliucheniiami po khodu vypuska i razlivki.** E. I. Malinovskii and A. N. Morozov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1957, no. 8, Aug., p. 102-108.

Experiments to find a way to decrease contamination covered the effects of refractory materials of the ladle and siphon system and the effect of secondary oxidation on formation of oxide inclusions. As radioindicators, Zr-95 and Ta-182 were used.

2554 The Recovery of Thorium - 230 From Uranium Wastes. D. J. Carswell, J. M. Fletcher, and D. W. Clelland. *Journal of Inorganic and Nuclear Chemistry*, v. 5, no. 2, 1957, p. 147-152.

A solvent extraction with dibutyl Carbitol and tributyl phosphate (TBP) cycles was used to recover Th with a ^{230}Th content of 12% from a solid hydroxide waste, containing 6 p.p.m. ^{230}Th, which arose from the extraction of U from pitchblende. Outlines a process consisting of successive counter-current extraction cycles with dilute (5%) and concentrated (40%) TBP.

2555 Design of Pyrometallurgical Pilot Plants. R. C. Buehl. *Journal of Metals*, v. 9, sec. 1, Oct. 1957, p. 1359-1362.

Design of specific plants: electric arc melting, blast, and open-hearth furnaces; converters. Relation to industrial plants. Importance of heat loss.

2556 Effects of Crystal Orientation, Temperature, and Molten Zone Thickness in Temperature-Gradient Zone-Melting. J. H. Wernick. *Journal of Metals*, v. 9, sec. 2; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Oct. 1957, p. 1169-1173.

A strong orientation effect has been found for molten Al-rich wire zones traversing single crystals of Ge. If the intersection of a $\{111\}$ plane with the plane of wire-travel is oblique to the wire, the wire breaks into segments that lie parallel to the line of intersection. However, if the line of intersection is perpendicular or parallel to the wire, the wire remains straight. This crystalline anisotrophy has been utilized to make highly parallel *npn* junctions using Al rich wire zones in Ge. The rate of zone movement increases unusually rapidly with temperature and with diameter of the wire zone. These findings suggest that the rate-controlling factor in these experiments is not diffusion in the liquid zone, but the solution rate at the hotter interface. Diffusion may become the limiting process at higher temperatures and lower temperature gradients.

2557 Electrowinning of Uranium From Its Oxides. I. Laboratory Studies. L. W. Niedrach and B. E. Dearing. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1761, Apr. 1957, 54 p. (UF767 Un3.1ka Contin.)

Background work for a new continuous process for the production of U by electrolytic reduction of the oxides in fused salt electrolytes above the melting point of U. Effects of current, salt bath composition, and other variables on efficiency and cell operation are discussed.

2558 A Method for the Production of Titanium-Aluminum Alloys by Reduction of Titanium Oxide. I. L. F. Mondolfo and A. Roy. *Light Metal Age*, v. 15, Oct. 1957, p. 11 + 3 pages.

Method consists of: reduction of TiO_2 with Al to produce an Al-Ti alloy; removal of the Al by leaching with Mg and/or Zn and separation by decantation; removal of the last traces of Mg and Zn by distillation.

2559* (French.) A Hundred Years' Use of Cowper Stoves. **Cent ans d'utilisation des appareils cowpers.** Daniel Petit. *Métallurgie et la Construction Mécanique*, v. 89, Oct. 1957, p. 845 + 4 pages.

Present status of the Cowper stove is studied from the points of view of brickwork and construction.

2560 Direct Chill Casting of Large Aluminum Ingots. A. T. Taylor, D. H. Thompson, and J. J. Wegner. *Metal Progress*, v. 72, Nov. 1957, p. 70-74.

Interrupted quenching is incorporated in the D. C. process to produce sound castings in sizes large enough to provide billets for huge forging and extrusion presses. A simple air blast device interrupts the flow of quenching water.

2561 Plutonium Recycling With Molten UF_4. Archie G. Buyers. *Nucleonics*, v. 15, Nov. 1957, p. 100-103.

Plutonium transfer from spent to fresh U fuel by oxidation into molten UF_4 and reduction of the fluoride mixture to U-Pu alloy was successfully accomplished. Scaled up, the process is calculated to yield 85% of the Pu. Final alloy should contain 15-35% of the rare earths and $<10\%$ of other fission products. Suggested applications are to the Sodium Graphite Reactor and enriched-core fast-breeder fuel cycles.

2562 High Enrichment of Uranium-235. B. Hermatz, H. C. McCurdy, F. N. Case, and R. S. Livingston. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2381, Nov. 1957, 22 p. (UF767 U3o Contin.)

Results from three programs for the production of highly enriched U^{235} by the electro-magnetic process.

2563* (German.) The Control of Open-Hearth Furnaces. **Die Regelung von Siemens-Martin-Öfen.** Wilhelm Liesegang. *Siemens Zeitschrift*, v. 31, nos. 10-11, Oct.-Nov. 1957, p. 477-481.

In connection with the basic requirements of the control installations in steelmaking plants the author studied the regulation of heating chamber pressure, crown temperature, and O_2 content.

2564 (German.) Fundamental Considerations on the Production of Rimmed Steel of High Quality. **Grundsätzliche Betrachtungen zur Herstellung von qualitativ hochwertigem beruhhigtem Stahl.** Hermann Schenck. *Stahl und Eisen*, v. 77, no. 21, Oct. 17, 1957, p. 1442-1450.

Problems of slag and its effect on steel, as well as the appearance and removal of O dissolved in the molten steel.

2565 (German.) Investigations on Converter Smoke With a View to the Control of the Basic Bessemer Process by Spectral Analysis. **Untersuchungen über den Konverterrauch im Hinblick auf die spektrale Überwachung des Thomasverfahrens.** Franz Wever, et al. *Stahl und Eisen*, v. 77, no. 21, Oct. 17, 1957, p. 1451-1459.

Interpretation of the spectrometer curve on the basis of the optical characteristics of the converter flame and smoke.

2566 (German.) Trials With Graded Steel Plant Limestone in the Basic Bessemer Converter. **Versuche mit klassiertem Stahlwerkskalk im Thomaskonverter.** Karl Ernest Mayer, Hans Jürgen Därmann, Gerhard Trömel, and Karl Heinz Obst. *Stahl und Eisen*, v. 77, no. 22, Oct. 31, 1957, p. 1614-1618.

2567* (Russian.) Developments in Converter Steel Production. **Razvitie konverternogo proizvodstva.** S. G. Afanas'ev. *Stal'*, v. 17, no. 11, Nov. 1957, p. 982-987.

Surveys Bessemer steel production in Soviet Russia.

2568* (Russian.) Automation of Heating and Technological Processes in the Iron Industry. **Avtomatizatsiia teplovykh i tekhnologicheskikh protsessov na predpriiatiiakh chernoi metallurgii.** V. V. Vorobei and A. M. Zimakov. *Stal'*, v. 17, no. 11, Nov. 1957, p. 1024-1027.

Survey of automation in the blast, open-hearth, and electric furnace processes, and in metal rolling.

2569* (Russian.) Work with Alkali Metals. **O rabote so shchelochnymi metallami.** P. P. Pugachevich. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 9, Sept. 1957, p. 2140-2142.

Purifying alkali metals in vacuo and production techniques for alkali metal amalgams.

2570* (Russian.) Preparation of Indium Antimonide of High Purity by the Method of Zone Melting. **Poluchenie sur'mianistogo indiia vysokoi stepeni chistoty metodom zonnoi plavki.** K. I. Vinogradova, v. v. Galavanov, and D. N. Nasledov. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 9, Sept. 1957, p. 1976-1984.

Method and equipment for obtaining super-pure InSb.

See also: **1681** (ceramic crucible for melting Ti); **1697** (basic openhearth bottoms); **2157** (electrolytic Th metal); **2704** (effect of ingot quality on rolling behavior).

METALS—FINISHING, POLISHING, AND CLEANING

2571 New Stripping Solution for Phosphate Coatings. S. L. Eisler. *Industrial Finishing (London)*, v. 9, Oct. 1957, p. 878 + 5 pages.

Tests were conducted using radiometric techniques to determine the effectiveness of a solution containing NaOH and NaCN alone, and also with a sequestering agent, as a stripping solution for phosphate coatings.

2572 Metal Finishing Guidebook and Directory, 1958. 26th Ed. 678 p. 1957. Finishing Publications, Westwood, N. J. (T13 M56f)

Includes papers on finishing plant engineering; mechanical and chemical surface preparation; plating solutions and operating data; special plating procedures; special surface treatments; control, analysis, and testing.

2573 (German.) Experience With Mechanical Descaling Plants for Steel Bars and Semi-Finished Steel. **Erfahrungen mit mechanischen Entzunderungsanlagen für Stabstahl und Halbzeug.** Fritz Schweitzer. *Stahl und Eisen*, v. 77, no. 21, Oct. 17, 1957, p. 1476-1482.

Methods of operation of the different types of shot-blasting plants, blast-cleaning mediums and their cost.

2574* Barrel Finishing Operation Improves Fatigue Strength of Jet Engine Parts. J. D. Marble and C. V. Ruehrwein. *Tool Engineer*, v. 39, Nov. 1957, p. 99-101.

Barrel finishing produced satisfactory finishes at acceptable rates of speed and relatively low cost. Tests established that the degree of surface roughness has a pronounced effect on the fatigue limits of hardened AISI 4130 steel.

See also: **2075** (preparation for protective coatings).

METALS—FOUNDRY PRACTICE

2575* Metallurgical Factors Affecting Locomotive Castings. W. Montgomery. *British Foundryman*, v. 50, pt. 10, Oct. 1957, p. 493-503.

Typical castings and associated production problems; nondestructive testing methods; wear of brake shoes and cylinder linears; reclamation of iron castings by welding; a self-hardening core oil based on tung oil.

2576 Quality Predictions on Liquid Cast Iron and Steel Based on Optical Temperature Measurements. K. Orths. *Henry Brutcher Translation No.* 3803, 18 p. (Abridged from *Archiv für das Eisenhüttenwesen*, v. 27, no. 5, 1956, p. 289-295.) Henry Brutcher, Altadena, Calif.

Determination of the difference between true and black temperatures; use to detect and eliminate causes of poor quality of cupola iron and steel.

2577 Boron-Needled Plain Carbon Cast Steel. Ia. E. Gol'dshtein, L. L. Pyatakova, and O. D. Zhizhakina. *Henry Brutcher Translation No.* 3986, 12 p. (From *Vestnik Mashinostroeniia*, v. 36, no. 7, 1956, p. 23-27.) Henry Brutcher, Altadena, Calif.

Technique of introducing B into medium C steels (0.45 to 0.49% and 0.31 to 0.39% C) during casting; effect of B additions on mechanical properties; best boron alloys and quantities to use; most favorable pouring temperature.

2578* (French.) Chill Casting of Copper Alloys. **Le moulage en coquille des alliages cuivreux.** M. Maurice Billing. *Fonderie*, 1957, no. 140, Sept., p. 391-399.

Advantages of gravity chill casting of Cu-Al alloys and brass. Methods; properties. Rules for temperature and proportions of metal; apparatus and feeding process.

2579* (French.) Non-Magnetic Cast Iron. **La fonte non magnétique.** M. Zbigniew Tyszko. *Fonderie*, 1957, no. 140, Sept., p. 411-421.

Theoretical bases of the non-magnetic iron foundry. Ratio between spontaneous magnetization and temperature. Effect of alloy additions on the transformation of γ iron into α iron, and magnetic transformations in different alloys. Present development in magnetic and non-magnetic iron.

2580* (French.) Possibilities of Applying Statistical Methods in the Foundry. **Possibilités d'application des méthodes statistiques en fonderie.** L. Dor. *Fonderie Belge*, 1957, no. 5, May, p. 81-91.

Definition of modern statistics; the theory of probabilities. Statistical control of quality and practical applications; signification test; statistical test of the independence of samples; statistical acceptance control.

2581 Vibration Can Improve Casting Quality. A. H. Freedman, J. F. Wallace, and F. A. Carbonaro. *Foundry*, v. 85, Nov. 1957, p. 98-101.

Beneficial effects include degassing of molten metals, grain refinement of solidifying metals, and improvement in the detail of castings by an increase in the "apparent fluidity".

2582 Carbon-Pickup in the Cupola. How to Test for Factors Affecting It. Michael Perch and Charles C. Russell. *Foundry*, v. 85, Dec. 1957, p. 70-75.

Ash content of coke, or its major constituent, Si, has a significant inhibiting effect on C solubility in Fe. The type of Fe also seems to be important to the amount of C pickup.

2583 Mold-Metal Interface Reactions. Howard F. Taylor and Jose Navarro. *Foundry*, v. 85, Dec. 1957, p. 76-80.

Theory for interface control which is basic enough to explain observed phenomena in the fields of investment casting, conventional sand mold processes, and metal oxidation.

2584 Shrinkage in Tin Bronze Castings. Clyde L. Frear. *Foundry*, v. 85, Dec. 1957, p. 81-85.

First article in series explaining the behavior of tin bronzes, causes of defects, and methods for overcoming the difficulties.

2585 How to Make Epoxy Patterns and Coreboxes. John W. Tierney. *Foundry*, v. 85, Dec. 1957, p. 86-90.

Applications of epoxy plastics for duplication of patterns and coreboxes.

2586 Stainless and Heat-Resistant Investment Castings. R. Taylor. *Foundry Trade Journal*, v. 103, Oct. 24, 1957, p. 483-494.

History; economic considerations; modern production procedures; alloy composition; mechanical properties; dimensional reproduction; range of products.

2587* (German.) Melting of Plain Carbon Steel for Steel Castings in the Low-Frequency Induction Crucible Furnace. **Das Schmelzen von unlegiertem Stahlguss im Niederfrequenz-Induktions-Tiegelschmelzofen.** Heinz Rohn. *Giesserei*, v. 44, no. 22, Oct. 24, 1957, p. 662-665.

Comparison of the conventional melting units with the L.F. crucible furnace from the metallurgical and economic point of view. Experiences with a 6-ton L.F. induction furnace as well as with a melting unit consisting of three 1.5-ton furnaces.

2588* (German.) Calculation of the Riser Neck on Sand Castings. **Berechnung des Steigeranschnittes bei Sandguss.** Richard Namur. *Giesserei*, v. 44, no. 22, Oct. 24, 1957, p. 665-671.

Theoretical considerations. Investigation of the ratios of the quantities involved. Application in practice. Design of the ingate.

2589* (German.) Specialization in Manufacturing CO_2-Water Glass Molds Without Flasks for the Purpose of Mechanization. **Von der Spezialisierung über die Herstellung von kastenlosen CO_2-Wasserglas-Formen zur Mechanisierung.** Karl Haake. *Giessereitechnik*, v. 3, no. 9, Sept. 1957, p. 193-197.

Historical background of the CO_2 method and economic advantages. Description of the cooling process. The right proportions in mixing quartz-sand and water-glass. Changes in the molding machine work, core making, and casting process.

2590* (German.) Problems in Manufacturing High-Pressure-Resisting Bronze Rg 5. **Probleme der Herstellung hochdruckfesten Rotgusses Rg 5.** Edmund R. Thews. *Giessereitechnik*, v. 3, no. 9, Sept. 1957, p. 201-205.

Outside causes of pore formation during casting. Defective cores and molds. Temperature and duration of the melting process. Reducing atmospheres in the hearth. Gas absorption. Corrective measures.

2591 Designing Vacuum Plaster-Mold Castings. W. G. Wilkins. *Machine Design*, v. 29, Nov. 28, 1957, p. 106-108.

The vacuum casting process and its use for intricate, high-strength castings. Mechanical properties of vacuum-cast alloys. Finishes and tolerance.

2592* (Dutch.) Some Characteristic Properties of Water Glass as Binding Agent for Molding and Core Sands. **Enkele karakteristieke eigenschappen van waterglas als bindmiddel voor vorm- en kernzand.** H. G. Levelink. *Metalen*, v. 12, no. 20, Oct. 31, 1957, p. 406-412.

Compressive strength of molding and core sands as a function of the time of treatment with CO_2 and of exposure to air. Effect of water glass composition with regard to the SiO_2/Na_2O ratio, solids content, and powder additions. (To be continued.)

2593* **Meet the Electronic Sandman.** J. R. Young. *Modern Castings*, v. 32, Nov. 1957, p. 36-37.

Description and operation of apparatus for automatic control of sand moisture.

2594* **3 Steps to Profitable Use of Molding Machines.** J. M. Leaman and D. C. Ekey. *Modern Castings*, v. 32, Nov. 1957, p. 41-48.

Methods of ramming; matching molding machines to the job; integration of machines and foundry layout; types of green sand molding machines now being sold.

2595* **Cast Aluminum Products.** W. D. Stewart. *Modern Metals*, v. 13, Nov. 1957, p. 82 + 4 pages.

Alloy selection, choice of casting process, design considerations, and other factors in making Al products.

2596 "D Molds" Make Precise Steel Castings. *Steel*, v. 141, Nov. 11, 1957, p. 110-113.

Carbon and low alloy steel castings made in Dietert process shells have close tolerances and fine surfaces. Production operations are outlined.

2597* **Engineering Properties of Pattern Waxes.** Charles J. Marsel, Leonard Kramer, and Alexander Saunders. *Tool Engineer*, v. 39, Nov. 1957, p. 95-98.

Data on viscosity, hardness, volumetric expansion, tensile strength, and cooling characteristics of six commercial waxes.

2598* (Polish.) The Technique of Casting Rollers of Spheroidal Cast Iron. **Technologia odlewania waleów z żeliwa sferoidalnego.** Bogumił Raczyński. *Wiadomości Hutnicze*, v. 13, no. 10, Oct. 1957, p. 296-299.

General considerations on rollers of spheroidal cast iron. Ladle treatment of cast iron. Molding methods and difficulties.

See also: **2465** (growth of gray iron); **2643** (evaluation of cast vs. wrought products); **3011** (brass foundry dust collector).

METALS—HEAT TREATMENT

2599* **Integrate Heat Treating Through Automation.** Carl C. Paulson and Herbert W. Westeren. *Automation*, v. 4, Nov. 1957, p. 59-61.

2600* (German.) Electrically Heated Soaking Pits. **Elektrische beheizte Tieföfen.** W. Poensgen. *Elektrowärme*, v. 15, Oct. 1957, p. 361-364.

Heating troughs filled with resistor coke serve as thermal source. Process results in greatly reduced scale loss.

2601* (Polish.) The Problems of Electrotechnical Sheet Steel Decarburization. **Zagadnienia odwęglania blach elektrotechnicznych.** J. Groyecki. *Hutnik*, v. 24, nos. 7-8, July-Aug. 1957, p. 289-295.

Decarburization of steel in gaseous atmospheres of CO-CO_2 or H_2-CH_4. Results with low C and Si steels.

2602 The Heat-Treatment of Mild Steel in Raw Town-Gas and Ammonia Atmospheres. M. A. H. Howes and E. Mitchell. *Iron and Steel Institute, Journal*, v. 187, Nov. 1957, p. 177-190.

Raw town gas and ammonia can be used for production case-hardening of mild steel. Ammonia additions of 1 to 10% and temperatures of 850 to 900 C give the most satisfactory hardening.

2603* (Dutch.) Cost Saving Isothermal Soft Annealing of Forged Chromium Steel. **Kostenbesparing door isotherm zachtgloeien van gesmeed chroomstaal.** C. H. Luiten. *Metalen*, v. 12, no. 19, Oct. 15, 1957, p. 391-394.

Chromium steel with about 13% Cr and 0.3% C. Properties and use. Structural change. Soft annealing after the formation of martensite. Isothermal change of the austenite structure at 700 C.

2604* (German.) A Hardenable Copper-Titanium-Aluminum Alloy. **Über eine aushärtbare Kupfer-Titan-Aluminium-Legierung.** W. Gruhl and H. Cordier. *Metall*, v. 11, Nov. 1957, p. 928-933.

Study of the hardenability of some alloys by testing their hardness, strength, elastic limit, expansibility, and electrical conductivity at different temperatures. Because of very slow diffusion, 1000 hr. were necessary for maximum aging values.

2605* (Russian.) Surface Hardening of Carbon Steel by Gas Carburizing. **Poverkhnostnoe uprochnenie uglerodistykh stalei gazovoi tsementatsiei.** O. K. Kotov. *Metallovedenie i Obrabotka Metallov*, 1957, no. 10, Oct., p. 28-33.

Effect of chemical heat treatment (carburizing) and high-temperature gas carbonitriding on mechanical properties of standard quality carbon steel.

2606* (Russian.) On the Industrial Application of Gas Cyanidation. **O promyshlennom primenenii gazovogo tsianirovaniia.** B. A. Stetsenko. *Metallovedenie i Obrabotka Metallov*, 1957, no. 10, Oct., p. 43-48.

Method and technology of gas cyanidation; its economic advantages in comparison with carburization.

2607 (German.) Aptitude of the End-Quenching Test for the Prediction of the Results Obtained in Flame-Hardening Steel Castings. **Eignung des Stirnabschreckversuches für die Vorhersage der Ergebnisse beim Brennhärten von Stahlguss.** Hans Wilhelm Grönegress. *Stahl und Eisen*, v. 77, no. 22, Oct. 31, 1957, p. 1619-1623.

Determination of hardness penetration in steel castings made of steel types GS-C 45, GS-36 Mn 5, GS-46 Mn 4, GS-38 MnSi 4, GS-46 MnSi 4, and GS 42-CrMo 3, with the aid of end quenching tests and feed hardening tests in flame-hardening. Comparison of curves for hardness distribution across the cross-section. Effects of preheating, quenching temperature, and type of heating.

2608 Single Stack Annealing Gets the Nod. Howard E. Miller. *Steel*, v. 141, Nov. 11, 1957, p. 118 + 4 pages.

Comparison of single and multiple stack furnaces for annealing coil products favors the latter type. Excerpts from an international symposium on annealing of low carbon steel are included.

2609 Prepared Annealing Atmospheres. George J. Campbell. *Steel*, v. 141, Nov. 18, 1957, p. 160 + 6 pages.

Some practical tips on avoiding atmosphere difficulties in annealing low carbon steel strip.

See also: **2478** (heat treatment of cast iron); **2519** (oxide scale formation on billets); **2660** (study of 885 F embrittlement); **2661** (heat treatment of U-Ti alloys); **2723** (tempering of steel).

METALS—MECHANICAL AND PHYSICAL PROPERTIES

2610 (English.) **Viscous Creep of Aluminum Near Its Melting Temperature.** J. Harper and J. E. Dorn. *Acta Metallurgica*, v. 5, no. 11, Nov. 1957, p. 654-665.

A study of pure polycrystalline Al under stresses between 3 and 13 psi. showed a linear variation of the secondary creep rate with stress. At slightly higher stresses the creep rate increased with the fourth power of the stress. The activation energy for creep is about 35,500 cal./mole over the entire stress range. Observations on the displacements of markers at grain boundaries, and on creep recovery upon removal of the stress indicate that the Nabarro-Herring model for stress-directed self diffusion of vacancies does not apply to Al. A dislocation-climb mechanism is suggested.

2611 (English.) **Scatter of Fatigue Life and Fatigue Strength in Aircraft Structural Materials and Parts.** Waloddi Weibull. *Aeronautical Research Institute of Sweden, Report* 73, 1957, 25 p. (TL504 F67m Vis.)

Fatigue properties are described by a simple S-N curve, derived from experimental work on steel, Al alloys, and Cu.

2612 The Detection of Fatigue Cracks in Specimens Under Dynamic Loading. An Electrical Circuit Method for Metallic Materials. J. R. Linge. *Aircraft Engineering*, v. 29, Nov. 1957, p. 334-342.

Scheme comprises the cementing of an electrical circuit in the form of a fine insulated Cu wire to the surface of the specimen under test. When a fatigue crack crosses the wire it breaks and actuates warning or control mechanisms.

2613 Cyclic Strain Fatigue Studies on AISI Type 347 Stainless Steel. E. E. Baldwin, G. J. Sokol, and L. F. Coffin, Jr. *American Society for Testing Materials, Preprint No.* 64, 1957, 15 p. (TA401 Am35p Vis.)

Test results on this steel subjected to constant-temperature cyclic strains ranging from 0.0035-in. per in. to 0.02-in. per in. Parameters investigated include temperature (600 C max.), grain size, anisotropy, and influence of sequential loading.

2614 Effect of Grinding Conditions and Resultant Residual Stresses on the Fatigue Strength of Hardened Steel. L. P. Tarasov, W. S. Hyler, and H. R. Letner. *American Society for Testing Materials, Preprint No.* 65, 1957, 18 p. (TA401 Am35p Vis.)

Fatigue limit was investigated as a function of the residual stresses generated in flat test bars by longitudinal surface grinding, the experimental variables being wheel hardness, grinding fluid, and unit down-feed. For good commercial grinding conditions the limit was the same as that obtained under gentle grinding. Severe grinding caused a decrease of about 13%. Cyclic stressing did not reduce the magnitude of the residual stresses.

2615 Properties of Open-Hearth and Bessemer Seamless Pipe. A. B. Wilder and W. P. Benter. *American Society for Testing Materials, Preprint No.* 67, 1957, 19 p. (TA401 Am35p Vis.)

Capper (rimmed) steels were rolled into seamless pipe for comparison with the killed steels generally employed in the manufacture of seamless pipe.

2616 The Static Properties of Several High-Strength Steels. E. P. Klier, B. B. Muvdi, and G. Sachs. *American Society for Testing Materials, Preprint No.* 68, 1957, 14 p. (TA401 Am35p Vis.)

Influence of strength level, orientation, composition, eccentricity of the load, as-processed section size, and stress concentration on the notch tension properties of 10 steels heat treated to strengths above 200,000 psi.

2617 Effect of Phosphorus on the Susceptibility to Temper Embrittlement of Cast Cr-Mo-V Steel. J. Chaberek and R. S. Zeno. *American Society for Testing Materials, Preprint No.* 69, 1957, 15 p. (TA401 Am35p Vis.)

Isothermally aged material at P levels higher than 0.02% were susceptible to temper embrittlement.

2618 Influence of Notch Preparation and Eccentricity of Loading on the Notch Rupture Life. M. H. Jones, J. L. Shannon, and W. F. Brown, Jr. *American Society for Testing Materials, Preprint No.* 70, 1957, 32 p. (TA401 Am34p Vis.)

Data on the Cr-Mo-V steel 17-22A(S) and the super alloy A-286.

2619 Tensile and Creep Properties of Tungsten at Elevated Temperatures. J. W. Pugh. *American Society for Testing Materials, Preprint No.* 71, 1957, 10 p. (TA401 Am35p Vis.)

2620 Dynamic Elastic Modulus Values at Elevated Temperatures for Nickel-Base, Aluminum-Base, and Metal-Metal Oxide Alloys. Robert F. Wilde and Nicholas J. Grant. *American Society for Testing Materials, Preprint No.* 72, 1957, 9 p. (TA401 Am35p Vis.)

The elastic modulus was measured by a dynamic method for heat-resistant Ni-base alloys from 80 to 1600 F; for type 316 stainless steel from 80 to 1600 F; for pure Al and a number of high-purity solid solution alloys from 80 to 800 F; and for a number of sintered, extruded metal-metal oxide alloys based on Cu and Ni.

2621 Microhardness Testing at High Temperatures. J. H. Westbrook. *American Society for Testing Materials, Preprint No.* 73, 1957, 23 p. (TA401 Am35p Vis.)

Construction, operation, characteristics, and application of a hot-hardness tester of modified Bergh design with a temperature range of 20 to 1500 C and a load range of 20 to 900 g.

2622 Electrical Resistivity and Thermoelectric Potential of Rhenium Metal. Gordon B. Gaines and Chester T. Sims. *American Society for Testing Materials, Preprint No.* 75, 1957, 10 p. (TA401 Am35p Vis.)

An equation is derived for the resistivity of Re with an impurity content of approximately 0.006%. The thermoelectric potentials generated by Re-Mo, Re-W, and Re-Ta junctions were measured over the temperature range from 870 to 2490 C. The first two show promise as thermocouples up to 2600 C in neutral or reducing atmosphere.

2623 Determination of Strain-Hardening Characteristics by Torsion Testing. D. S. Fields, Jr. and W. A. Backofen. *American Society for Testing Materials, Preprint No.* 84, 1957, 13 p. (TA401 Am35p Vis.)

The conventional analysis of plastic torsion in a cylindrical specimen was generalized to include rate sensitive materials. Methods are deduced by which stress, strain, and strain-rate relationships may be obtained from the fewest possible specimens with a minimum amount of graphical construction.

2624 Constant Head Rate Testing Machine With Instantaneous Speed Change. M. J. Manjoine, E. T. Wessel, and W. H. Pryle. *American Society for Testing Materials, Preprint No.* 85, 1957, 4 p. (TA401 Am35p Vis.)

Machine in which the head motion can be instantaneously changed in direction or in speed over a range of 1,000,000 to 1 will enable application of new techniques in the study of flow and fracture of materials from subnormal to elevated temperatures.

2625 Fatigue Tests of Large Alloy Steel Shafts. F. C. Eaton. *American Society for Testing Materials, Preprint No.* 86a, 1957, 8 p. (TA401 Am35p Vis.)

Tests were made on 9-in. diameter unnotched Ni-Cr-Mo alloy shafts, 8½-in. diameter notched shafts, and on 0.469-in. diameter specimens removed from one of the large shafts broken. Data indicates a considerably lower fatigue limit for the large diameter unnotched shafts than for the smaller specimens.

2626 Torsional Fatigue Testing of Axle Shafts. E. J. Eckert. *American Society for Testing Materials, Preprint No.* 86b, 1957, 13 p. (TA401 Am35p Vis.)

Design, build-up, and running of the testing machines. Effect of various surface conditions and hardness.

2627 A Unique Machine for Large Scale Fatigue Testing. H. V. Cordiano. *American Society for Testing Materials, Preprint No.* 86c, 1957, 15 p. (TA401 Am35p Vis.)

Machine operates on the principle of the dynamic vibration absorber and uses to advantage the condition that at some frequency between the two resonance frequencies of the system the disturbing force is equal to the force developed in the damper spring.

2628* (German.) Magnetic Aging of Soft Steel. **Zur Frage der magnetischen Alterung von weichem Stahl.** Werner Matz and Walter Peter. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 655-662.

Several rimmed steels were tested by a statistical evaluation method. Nitrogen, O, and to a certain extent S, increase the aging. The contrary happens with Mn and Cr. Phosphorus and C had no effect.

2629* (German.) A Method for the Direct Examination of Structural Fractures in the Microscope. **Über ein Verfahren zur unmittelbaren Beobachtung von Bruchgefügen im Elektronenmikroskop.** Wolfgang Pitsch. *Archiv für das Eisenhüttenwesen,* v. 28, Oct. 1957, p. 663-666.

A carbon replica method for the direct reproduction of structural fractures with the electron microscope. Elimination of the usual change of the fracture by action of the solution on the crystal structure. Application to an austenitic and to a ferritic steel.

2630 The Flow and Fracture of Nodular Cast Iron. W. R. Clough and M. E. Shank. *ASME, Transactions,* v. 79, Nov. 1957, p. 1911-1920.

2631 Creep Characteristics of Type 347 Stainless Steel at 1050 and 1100 F in Tension and Compression. M. J. Manjoine. *ASME, Transactions,* v. 79, Nov. 1957, p. 1921-1928.

Cold-drawn and stress-relieved Type 347 heavy-wall tubing flows plastically at service temperatures when subjected to a stress below the 10,000-hr. rupture strength. Precipitation induced by the strain and temperature conditions causes an extended period of abnormally high creep resistance. The duration of this period increases with decreasing stress and is longer for compression than for tension.

2632* The Physical Properties and Alloying Behaviour of Plutonium Metal. M. B. Waldron. *Atomics & Nuclear Energy,* v. 8, Oct. 1957, p. 383 + 4 pages.

2633* The Wetting of Solids by Liquid Metals. B. R. T. Frost. *Atomics & Nuclear Energy,* v. 8, Oct. 1957, p. 387-390.

Fundamentals of wetting and general conclusions from wetting experiments. Problems peculiar to the field of nuclear engineering. Thermal and electrical conductivity.

2634 Effect of Tempering Upon Mechanical Properties of Chromium-Plated Steel Parts. V. S. Borisov and F. N. Naumov. *Henry Brutcher Translation No.* 404, 10 p. (Abridged from *Metallovedenie i Obrabotka Metallov,* 1956, no. 12, Dec., p. 50-56.) Henry Brutcher, Altadena, Calif.

Effect of Cr deposit thickness and of tempering temperature upon tensile strength, elongation, and rotating-beam fatigue limit of a carbon and a low-alloy steel.

2635 Deformation of Solids at High Rates of Strain. A. H. Cottrell. *Chartered Mechanical Engineer,* v. 4, Nov. 1957, p. 448-460.

Elastic and plastic waves; cracks in semi-brittle materials; heating effects; slip in crystals; centers of dislocations; yield points; yield and fracture at low temperature; delayed yield; fracture at temperatures above zero K.

2636* (French.) Determining the Heat of Activation Occurring During the Hot Deformation of a Stable Austenite and of a Soft Iron. **Détermination des chaleurs d'activation intervenant dans la déformation à chaud d'une austénite stable et d'un fer doux.** Ramchandra Tamhankar, et al. *Comptes Rendus,* v. 245, no. 15, Oct. 7, 1957, p. 1242-1244.

An austenite steel with 36% Ni and 10% Cr and an iron with 0.003% C were tested for creep (550-800 C), torsion strength (1000-1200 C), and internal friction to the melting point; activation heat during hot working was determined.

2637* (French.) The Cu-Zn and Cu-Sn Alloys. **Sur les alliages Cu-Zn et Cu-Sn.** Ordan Pečijare and Sylvain Janssen. *Comptes Rendus,* v. 245, no. 16, Oct. 14, 1957, p. 1306-1309.

Variation of resistivity as a function of temperature for alloys with 48, 53, 56.5, 65, and 62% Zn.

2638* (French.) Effect of Fine Graphite Grain Distribution and Granular Structure on the Endurance of Castings Against Alternating Stresses. **Influence de la finesse de répartition des grains de graphite et de leur structure sur l'endurance des fontes aux efforts alternés.** Jacques Pomey, et al. *Comptes Rendus,* v. 245, no. 16, Oct. 14, 1957, p. 1311-1314.

Limit of endurance during rotary flexion of pearlitic castings with nodular, spheroidal, or diffused graphite. An analog method was used to show the importance of the strain gradient.

2639* (French.) Metallographic Applications of Hot Hardness. **Utilisations métallographiques de la dureté à chaud.** Jacques Pomey, Alain Royez, and Jean Pol Georges. *Comptes Rendus,* v. 245, no. 17, Oct. 21, 1957, p. 1424-1427.

In the isothermal hardness test with constant stress, creep can be measured by the depth of penetration as a function of time.

2640* (Russian.) The Influence of Carbon and of Hardening Temperature on the Hardness of Martensite. **Vliianie ugleroda i temperatury zakalki stali na tverdost' martensita.** A. N. Rozanov. *Doklady Akademii Nauk SSSR,* v. 115, no. 4, Aug. 1, 1957, p. 721-722 + 1 plate.

Relationship between hardness and degree of lattice tetragonality, and the carbon content in martensite.

2641* (Russian.) Change of Electrical Resistivity During Elementary Slip. **Ob izmenenii elektricheskogo soprotivleniia pri elementarnom sdvigoobrazovanii.** E. D. Shchukin, V. N. Rozhanskii, and Iu. V. Goriunov. *Doklady Akademii Nauk SSSR,* v. 115, no. 6, Aug. 21, 1957, p. 1101-1103.

Investigation of slip in large single crystals of Cd and Zn between 500 and 2000 A.

2642* Magnetic Properties of High-Aluminum Iron Alloys. D. Pavlovic and K. Foster. *Electrical Manufacturing,* v. 60, Nov. 1957, p. 109-115.

The magnetic characteristics of new 14 to 17 wt.% Al-Fe alloys compared to oriented 3% Si iron and 50% Ni iron. Comparative data on two new high-permeability low-remanence Al-Fe alloys with residual induction of less than 1 kilogauss without an air gap.

2643 The Case Against the Tension Test. John B. Caine. *Foundry,* v. 85, Nov. 1957, p. 86-92.

Argues that ductility factors of the tension test underevaluate cast metals and overevaluate wrought metals.

2644 Dimensional Stability of Uranium-Chromium Alloys. M. C. Fraser, G. A. Last, and S. H. Bush. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-50624, June 1957, 19 p. (UF767 Un3.1hw Contin.)

Results were inconclusive insofar as correlating Cr level, orientation, or mechanical or physical properties with irradiation induced dimensional instability. All preferredly oriented specimens increased in length; these increases ranged from 2 to 17%. Nominal to relatively severe warping was observed.

2645 Neutron Irradiation Effects on the Tensile Properties of Zircaloy-2. R. S. Kemper and D. L. Zimmerman. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-52323, Aug. 1957, 24 p. (UF767 Un3.1hw Contin.)

The changes in room temperature tensile properties of annealed and 50% cold-worked Zircaloy-2 as a result of irradiation to an estimated integrated thermal neutron flux of 1.4×10^{21} nvt at 40 to 60 C. Recovery of radiation damage in initially annealed material in the range 250 to 400 C.

2646* (Polish.) Factors Influencing the Behavior of Some Kinds of Austenitic and Ferritic Steels During Hot Plastic Deformation. **Czynniki wpływajace na zachowanie się niektórych gatunków stali austenitycznej i ferrytycznej podczas plastycznej przeróbki na goraco.** Edward Terlecki. *Hutnik,* v. 24, no. 6, June 1957, p. 222-227.

Kinds of fractures occurring during hot plastic deformation of anticorrosive high-alloyed steels. Causes of cracking and methods for elimination. Technical suggestions for reducing the number of defects.

2647 The Effect of Silicon, Manganese, and Iron on the Ageing Characteristics of Aluminium-Copper Alloys Containing 3.0 and 4.5 Per Cent Copper. A. Chitty. Institute of *Metals, Journal,* v. 86, Oct. 1957, p. 65-76.

Hardness/aging-time curves at 21.5, 130, and 190 C were obtained for high-purity Al-base alloys, with separate additions of up to 2.0% Si and Mn, and up to 2.6% Fe. The general forms of the aging curves were not altered by the additions. Silicon in solid solution at the solution-treatment temperature (505 C) increased the rate of aging and the quenched-hardness values in proportion to the Si content, but the hardness increment was not affected. The quenched- and peak-hardness values, and the hardness increment between these values, were raised by the presence of Mn in solid solution at the solution-treatment temperature (525 C). Concentrations of Mn or Fe greater than the solid-solubility limit formed an insoluble phase containing both Cu and the third element. The presence of this phase was equivalent to a reduction in the Cu content of binary Al-Cu alloys. Additions of Fe beyond the (Al solid-solution +β) field produced a third phase, considered to be $FeAl_3$. The presence of this phase had little effect upon the peak-hardness values, but it increased the quenched hardness to some extent. It reduced the hardness increment of the 3.0% Cu alloys, but this effect was not very apparent in the case of the 4.5% Cu alloys.

2648 Some Metallographic Observations on the Fatigue Behaviour of Copper and Nickel and Certain of Their Alloys. C. A. Stubbington and P. J. E. Forsyth. *Institute of Metals, Journal,* v. 86, Oct. 1957, p. 90-94.

2649 The Effect of Neutron Irradiation on the Mechanical Properties of Molybdenum and Tungsten. M. J. Makin and E. Gillies. *Institute of Metals, Journal,* v. 86, Oct. 1957, p. 108-112.

The yield stress of Mo was increased by irradiation at all testing temperatures between 20 and 200 C, the increase being greater the higher the temperature. A marked yield point was developed after an anneal at 200 C for 60 min., suggesting migration to, and anchoring of, dislocations by vacancies produced during irradiation. The elongation before fracture was reduced by the irradiation. The ductile→brittle transition temperature of Mo was raised from −136 to −73 C by irradiation, in marked contrast to the small rise (from 118 to 126 C) in the transition temperature of fully recrystallized W.

2650 A Compressive Creep Test of Alpha-Uranium Under Neutron Irradiation. H. C. Rose. *Institute of Metals, Journal,* v. 86, Nov. 1957, p. 122-128.

Behavior at 450 C under a stress of 2.7 tons/in^2.

2651 The Influence of Impurities on the Magnetic Properties of High-Purity 3% Silicon Iron. D. A. Leak and G. M. Leak. *Iron and Steel Institute, Journal,* v. 187, Nov. 1957, p. 190-194.

Shows the variation of static hysteresis loss and coercive force of high-purity silicon iron with N and C content, for material slowly cooled from a high temperature.

2652* (Russian.) Viscosity of Molten Titanium. **Viazkost' rasplavlennogo titana.** G. A. Grigor'ev, V. P. Eliutin, and M. A. Maurakh. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1957, no. 8, Aug., p. 95-101.

Study of physico-chemical properties of molten Ti, particularly its viscosity. Relation between viscosity and such properties as flowability, velocity of gas and non-metallic impurities emerging at the surface, diffusion, and self-diffusion. Method and technology of viscosity measurement, design and application of a high-temperature viscosimeter.

2653 Low-Temperature Thermal Conductivity of Some Commercial Coppers. Robert L. Powell, H. Martin Roder, and William M. Rogers. *Journal of Applied Physics,* v. 28, Nov. 1957, p. 1282-1288.

Values are given for the thermal conductivity between 4 and 273 K of six commercial coppers and Cu alloys: coalesced, electrolytic tough-pitch, free-cutting (tellurium), phosphorus deoxidized coppers, free-cutting leaded brass, and silicon bronze A.

2654 Heat Capacity of Terbium From 15 to 350°K. L. D. Jennings, R. M. Stanton, and F. H. Spedding. *Journal of Chemical Physics,* v 27, Oct. 1957, p. 909-913.

2655 Tensile Deformation of Aluminum as a Function of Temperature, Strain Rate, and Grain Size. R. P. Carreker, Jr. and W. R. Hibbard, Jr. *Journal of Metals,* v. 9, sec. 2; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 209, Oct. 1957, p. 1157-1163.

Test data for two lots of high-purity Al, annealed to produce several different grain sizes from each lot. The testing temperature range 20 to 873 K (0.021 to 0.94 T/T*m*) was explored and the effect of strain rate was measured at 77 and 300 K.

2656 Creep of Al-Cu Alloys During Age Hardening. Ervin E. Underwood. *Journal of Metals,* v. 9, sec. 2; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 209, Oct. 1957, p. 1182-1189.

High-purity polycrystalline alloys of Al with 1 to 4% Cu were tested in creep over a temperature range of 200 to 540 C. Hardness, X-ray, and tensile data supplemented the creep results. Starting with alloys in the quenched, single-phase condition, creep tests were performed both within the single-phase and two-phase region of the equilibrium diagram.

2657 Transformation Kinetics and Mechanical Properties of Zr-Mo Alloys. R. F. Domagala, D. W. Levinson, and D. J. McPherson. *Journal of Metals,* v. 9, sec. 2; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 209, Oct. 1957, p. 1191-1196.

Alloys containing 1.3, 3.3, 5.4, and 7.5% Mo were prepared using high purity Mo and sponge Zr. Time-temperature-transformation curves were established for these alloys based on the resistivity vs. time of anneal curves of isothermally quenched rods. Tensile and impact bars of each alloy were heat treated by isothermal quench techniques as well as by quench and reheat treatments. These bars were then machined, tested, and properties compared. Optimum properties could be developed in the 1.3% Mo alloy using th isothermal quench technique. The 3.3, 5.4, and 7.5% Mo alloys exhibited a brittle behavior irrespective of type of heat treatment. An ω or transition phase in the $\beta \rightarrow \alpha$ transformation was discovered which undoubtedly accounts for most of the brittleness observed. The ω phase has been tentatively indexed as tetragonal, c/a=1.45.

2658 Copper-Silica and Copper-Alumina Alloys of High Temperature Interest. Klaus M. Zwilsky and Nicholas J. Grant. *Journal of Metals,* v. 9, sec. 2; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 209, Oct. 1957, p. 1197-1201.

Alloys containing up to 10 vol. % of oxide were prepared by mechanical mixing of powders, followed by cold hydrostatic pressing, sintering, and hot extrusion. Measurements were made of room temperature tensile properties, recrystallization temperature, creep rupture properties from 250 to 450 C, and resistivity.

2659 Elastic Properties of Yttrium and Eleven of the Rare Earth Elements. J. F. Smith, C. E. Carlson, and F. H. Spedding. *Journal of Metals,* v. 9, sec. 2; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 209, Oct. 1957, p. 1212-1213.

2660 Some Observations on 885°F Embrittlement. G. F. Tisinai and C. H. Samans. *Journal of Metals,* v. 9, sec. 2; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 209, Oct. 1957, p. 1221-1226.

The hardening of several 24 to 30% Cr steels was studied at temperatures near 885 F. In alloys containing normal amounts of C the temperature and time of preheat treatment affect the hardening, apparently because of destruction of potential hardening nuclei by carbide nucleation. This occurs to a lesser extent in decarburized alloys and does not occur at all if the carbon is stabilized by Ti or is sufficiently low. Nitrogen has an effect similar to that of C. Hardening does not occur in electrolytic Cr. Interference with the nucleation of the hardening constituent also affects the optimum hardening temperature. On the basis of one neutron diffraction run, long range ordering in any sizeable amount does not appear to be a likely explanation for 885 F hardening. Thus, the evidence tends to substantiate the belief that 885 F hardening is the result of coherent precipitation of a Cr-rich phase, the nature of which is still not entirely clear.

2661 Effect of Heat Treatment on the Hardness and Microstructure of U-Ti Alloys. David L. Douglass and Lyle L. Marsh, Jr. *Journal of Metals*, v. 9, sec. 2; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Oct. 1957, p. 1260-1267.

Hardness and microstructure may be varied over wide ranges by suitable heat treatment. Quench-temper or isothermal treatments were particularly effective. The over-all response to heat treatment was dependent upon the phases present during solution treatment. Results are interpreted in terms of the phase diagram.

2662 Notch Tensile Properties of Selected Titanium Alloys. E. P. Klier and N. J. Feola. *Journal of Metals*, v. 9, sec. 2; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Oct. 1957, p. 1271-1277.

2663 Some Internal Friction Studies in Columbium. R. W. Powers and Margaret V. Doyle. *Journal of Metals*, v. 9, sec. 2; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Oct. 1957, p. 1285-1288.

Carbon was found to diffuse in Cb at a slightly more rapid rate than N. At 1 c.p.s. that internal friction peak which arises from the stress-induced ordering of C in Cb is found at 268 C while the N peak occurs at 285 C.

2664* (Dutch.) Method for the Production of a Gridded Network on Metal Surfaces. **Methode voor het aanbrengen van een lijnennetwerk op metaaloppervlakken.** J. H. Zaat. *Metalen*, v. 12, no. 19, Oct. 15, 1957, p. 387-390.

Description of a tracing method, eliminating any enameling or etching process, for the production of sharp and adherent lines on flat metal surfaces in order to measure deformation.

2665* (German.) Investigations of the Strength of Copper-Titanium and Copper Zirconium Alloys. **Festigkeitsuntersuchungen an Kupfer-Titan- und Kupfer-Zirkon-Legierungen.** K. Dies. *Metall*, v. 11, Nov. 1957, p. 933-941.

Solubility of Ti in Cu at 400 C was about 0.4% Ti and increased with temperature up to 4.3% at 885 C. Alloys with more than 0.4% Ti were thermally hardenable. Solubility of Zr in Co was below 0.23% Zr at the eutectic temperature of 997 C and decreased with temperature. There was excellent retention of hardnss in both alloys.

2666* (Russian.) Influence of Carbon on Fatigue Limit of Carburizing Steel. **Vliianie ugleroda na predel ustalosti tsementuemoi stali.** I. D. Rybasenko. *Metallovedenie i Obrabotka Metallov*, 1957, no. 10, Oct., p. 19-21.

Investigation of two steels to determine the effect of C on strength under alternating loads (sinusoidal stresses). The fatigue strength of steels, with a surface concentration of 1.1% C increases with an increase of internal C content. Surface C contents above 1.1% leads decreased fatigue strengths.

2667* (Russian.) Effect of Cold Working on Some Mechanical Properties of High-Alloyed Carburized Steels. **Vliianie obrabotki kholodom na nekotorye mekhanicheskie svoistva vysokolegirovannykh tsementovannykh stalei.** Iu. G. Vyshkovskii and A. A. Iurgenson. *Metallovedenie i Obrabotka Metallov*, 1957, no. 10, Oct., p. 33-36.

Compares the effects of cold working on mechanical properties of specimens with various distributions of residual austenite in the carburized layer.

2668* (Russian.) Fatigue Strength of Specimens Built up by Automatic Submerged Arc Welding. **Ustalostnaia prochnost' obraztsov, naplavlennykh avtomaticheskoi svarkoi pod fliusom.** L. A. Glikman and A. N. Babaev. *Metallovedenie i Obrabotka Metallov*, 1957, no. 10, Oct., p. 37-43 + 1 plate.

Effect of preheating temperature and joint geometry on amount and distribution of residual stresses. Materials, methods, and results of investigation.

2669 Hardness and Other Physical Properties of Metals in Relation to Temperature. E. R. Petty. *Metallurgia*, v. 56, no. 337, Nov. 1957, p. 231-236.

The mode of deformation in the "equicohesive range" is discussed and used to explain the form of the hardness-temperature relationship for pure metals. A simple correlation between hardness and creep properties is shown to exist for a variety of metals.

2670 Notch Ductility of Normalized HTS Steel. P. P. Puzak. *Naval Research Laboratory, Report* 5007, Sept. 1957, 14 p. (T21 Un3.5n Contin.)

Summarizes the results of drop-weight, nil-ductility transition, and Charpy V properties established for recent-production, normalized HTS plates obtained on a limited sampling basis from four major steel producers.

2671 Ductility in Beryllium Related to Grain Orientation and Grain Size. Jacob Greenspan. *Nuclear Metals, Inc. (U. S. Atomic Energy Commission)*, NMI-1174, Aug. 1957, 39 p. (UF767 Un3.1nm Contin.)

Beryllium with grain orientations resulting from hot working either uni-directionally or bi-directionally is ductile or brittle in directions given by the anisotropy and orientation of the grains. Textures developed from various hot-working sequences are given and tensile results are correlated with textures.

2672 Heat Capacity of α Brasses Below 4.2° K. John A. Rayne. *Physical Review*, v. 108, ser. 2, Oct. 1, 1957, p. 22-25.

The variation of density of electronic states as a function of Zn composition suggests that the Fermi surface in Cu deviates appreciably from sphericity.

2673 Shock-Wave Compressions of Twenty-Seven Metals. Equations of State of Metals. John M. Walsh, Melvin H. Rice, Robert G. McQueen, and Frederick L. Yarger. *Physical Review*, v. 108, ser. 2, Oct. 15, 1957, p. 196-216.

An explosive system is used to drive a strong shock wave into a plate of 24ST Al. This shock wave propagates through the Al into small test specimens which are in contact with the front surface of the plate. A photographic technique is used to measure velocities associated with the Al shock wave and with the shock wave in each specimen.

2674 Low-Temperature Thermal Expansion of Copper. R. O. Simmons and R. W. Balluffi. *Physical Review*, v. 108, ser. 2, Oct. 15, 1957, p. 278-280.

A rotating single-crystal back-reflection X-ray diffraction technique was used. A possible decrease in the Grüneisen parameter exists near 40 K.

2675 Residual Resistivity of Copper and Silver Alloys: Dependence on Periodic Table. F. J. Blatt. *Physical Review*, v. 108, ser. 2, Oct. 15, 1957, p. 285-290.

Polyvalent impurities of the Ag period of the periodic table give rise to a smaller residual resistivity in both Cu and Ag than do polyvalent impurities belonging to the Cu period. Explanation is based on a modification of the Friedel sum rule by which one may take lattice distortion into account.

2676 A Determination of the Surface Tension of Liquid Tungsten by the Drop-Weight Method. A. Calverley. *Physical Society, Proceedings*, v. 70, no. 455B, Nov. 1957, p. 1040-1044.

Molten drops are made by bombarding the lower end of a vertically suspended rod with electrons.

2677 The Viscosity of Liquid Indium and Liquid Tin. M. F. Culpin. *Physical Society, Proceedings*, v. 70, no. 455B, Nov. 1957, p. 1069-1078.

Measurements were made over a range of temperature using the oscillating sphere viscometer. Results are compared with earlier works.

2678 The Viscosity of Liquid Magnesium and Liquid Calcium. M. F. Culpin. *Physical Society, Proceedings*, v. 70, no. 455B, Nov. 1957, p. 1079-1086.

2679* On the Magnetic Properties of Cubic Cerium. Tsuyoshi Murao and Takeo Matsubara. *Progress of Theoretical Physics*, v. 18, Sept. 1957, p. 215-222.

In terms of the level splitting of the electronic state $4f^1(^2F_{5/2})$ due to the crystalline and exchange field, the magnetic susceptibility and specific heat of cubic cerium are calculated theoretically and compared with experiments.

2680 Liquid Tin Solution Calorimeter for Measuring Heats of Formation of Alloys. Raymond L. Orr, Alfred Goldberg, and Ralph Hultgren. *Review of Scientific Instruments*, v. 28, Oct. 1957, p. 767-773.

Design, operation, and performance data.

2681 The Mechanism of Work-Hardening and Slip-Band Formation. J. Friedel. *Royal Society, Proceedings*, v. 242, ser. A, Oct. 29, 1957, p. 147-159 + 2 plates.

Stresses difference between the three stages of hardening: easy glide; the region of rapid hardening accompanied by short slip lines; and the region of slow or parabolic hardening which is temperature-dependent and in which long slip bands are formed.

2682 The Energy Stored in Fatigued Metals. L. M. Clarebrough, M. E. Hargreaves, and G. W. West. *Royal Society, Proceedings*, v. 242, ser. A, Oct. 29, 1957, p. 160-166 + 2 plates.

Determinations of stored energy and hardness for two series of specimens of O.F.H.C. Cu fatigued at stresses which give rise to failure at 2.8×10^4 cycles in one case and 10^8 cycles in the other. For specimens fatigued at high stress the stored energy is released by a combination of recovery and recrystallization, but for specimens fatigued at low stress only recovery was observed.

2683 The Hardening and Softening of Metals by Cyclic Stressing. T. Broom and R. K. Ham. *Royal Society, Proceedings*, v. 242, ser. A, Oct. 29, 1957, p. 166-179.

2684 The Initial Fatigue Crack. G. C. Smith. *Royal Society, Proceedings*, v. 242, ser. A, Oct. 29, 1957, p. 189-197 + 8 plates.

Considers the formation of persistent slip bands during cyclic stressing and their development into fatigue cracks. In Cu and Al at low temperatures fatigue cracks appear to be formed in this way; at room temperature in Al they may form also along grain boundaries.

2685 Slip-Band Damage and Extrusion. P. J. E. Forsyth. *Royal Society, Proceedings*, v. 242, ser. A, Oct. 29, 1957, p. 198-202 + 4 plates.

Slip-band extrusions in a fatigued Al-4% Cu alloy are less than 0.1μ thick, and often occur only along short lengths of the active slip band. Thickness of such a "ribbon" varies with different materials and fatigue conditions. The slip process which results in extrusion appears to be in the nature of reverse glide in which two sets of palnes near to one another slip in preferred directions. Confinement of slip to a few active planes as occurs in most Al alloys is due to some localized softening process. These processes are local recrystallization, aging, and a combination of both effects. In pure Al some Al alloys, holes may be observed along the slip bands. In AgCl, slip bands or striations which extrude also show crevices where retraction has occurred; the fatigue cracks seem to propagate from these crevices.

2686 The Fatigue and Ultimate Tensile Strengths of Metals Between 4·2 and 293°K. R. D. McCammon and H. M. Rosenberg. *Royal Society, Proceedings*, v. 242, ser. A, Oct. 29, 1957, p. 203-211.

Data on Cu, Ag, Au, Al, Mg, Zn, and Fe. Except for Zn and Fe, which exhibit brittle fracture at low temperatures, the fatigue characteristics improve very considerably as the temperature is reduced.

2687* (English.) **Effect of Isothermal Magnetic Annealing on the Magnetic Properties at Room Temperature in Ni-Co Alloys.** Hakaru Masumoto, Hideo Saitô, and Minoru Takahashi. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 9, no. 5, Oct. 1957, p. 374-394.

2688* (Russian.) Fracture Strength of Welded Heat Resistant "20KhML" Steel Castings in Long Term Test. **Issledovanie dlitel'noi prochnosti svarno-litykh soedinenii iz teploustoichivoi stali 20 KhML.** S. I. German. *Svarochnoe Proizvodstvo*, 1957, no. 10, Oct., p. 9-13.

Fracture strength of all weld metal specimens and welded joints at 475, 510, 530, and 550 C in air and superheated steam was investigated.

2689* (Russian.) Investigation of Hot-Crack Susceptibility of Welds on Copper and Copper Alloys. **Issledovanie sklonnosti medi i ee splavov k obrazovaniiu goriachikh treshchin pri svarke.** N. M. Chelnokov. *Svarochnoe Proizvodstvo*, 1957, no. 10, Oct., p. 18-22.

Lead, Cu_2O, and Bi increase, whereas Cr, Mn, Fe, Ni, and Ta decrease hot crack susceptibility.

2690 Vapor Pressures of Liquid Iron and Liquid Nickel. J. P. Morris, Glenn R. Zellars, S. L. Payne, and Richard L. Kipp. *U. S. Bureau of Mines, Report of Investigations* 5364, Sept. 1957, 10 p. (TN21 Un3r)

Measurements between 1540 and 1620 C by a gas-transport method resulted in the equations: $\log p_{mm}$ (Iron) = -19,460/T + 9.147 and $\log p_{mm}$ (nickel) = -21,030/T + 9.689.

2691 Investigation of Some Mechanical Properties of Thermenol Compressor Blades. Donald F. Johnson. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4097, Oct. 1957, 14 p. (TL570 Un3t)

A comparison of AISI type 403 stainless steel and thermenol blades. Modulus of elasticity and rigidity and damping were slightly lower for thermenol. However, thermenol showed better resistance to corrosion by sea water and proved equal or superior to stainless-steel in fatigue strength.

2692 Thermal Diffusivity of Metals at Elevated Temperatures. C. P. Butler and E. C. Y. Inn. *U. S. Naval Radiological Defense Laboratory, Research and Development Technical Report* USNRDL-TR-177, Sept. 1957, 27 p. (QC475 Un3.5r Contin.)

Cylindrical specimens were heated by the radiation from a carbon arc and their time-temperature history used to calculate thermal diffusivities.

2693 The Engineering Application of the Absolute Rate Theory to the Creep of Cast Magnesium. Mervin B. Hogan. *University of Utah, Engineering Experiment Station, Bulletin No.* 73, v. 46, no. 14, June 1955, 46 p. (QE169 Ut1.82b Vis.)

Experimental data pertaining to the creep of several cast Mg alloys were analyzed in terms of a four-element mechanical model as an analog, in conjunction with the absolute rate theory. Agreement between theory and data indicates that the absolute rate theory is a useful concept for engineering application to the creep of solids.

2694 Crack Initiation and Propagation in the V-Notch Charpy Impact Specimen. Carl E. Hartbower. *Welding Journal*, v. 36, Nov. 1957, p. 494S-502S.

2695 Relation of Charpy Impact Properties to Microstructure of Three Ship Steels. W. S. Owen, D. H. Whitmore, Morris Cohen, and B. L. Averbach. *Welding Journal*, v. 36, Nov. 1957, p. 503S-511S.

Relationships between the transition temperature and the microscopic parameters, reflecting the size and distribution of both the ferrite and pearlite volumes, were explored over a range of deoxidation practices, austenitizing temperatures, and cooling rates.

2696 Standardization of Torque Values for Stiffness Testing of Wires Used as Grid Side-Rods in Radio Tubes. J. R. Howell. *Wire and Wire Products*, v. 32, Nov. 1957, p. 1361 + 3 pages.

See also: **1554** (creep under combined loadings); **1568** (kinetic heating in aircraft structures); **2434** (fatigue of ball bearings); **2451** (creep in rods and plates); **2726** (impact strength and ductility of austenitic alloy steels); **2738** (hardness reversion of Al-Cu alloys); **2739** (aging hardness of Pb-Sb alloys); **2772** (ferrimagnetism in Mn_4N); **2778** (properties of sintered parts); **2779** (properties of sintered Al).

METALS—MECHANICAL WORKING

2697 A Modern Rod and Merchant Mill. W. R. Potts and R. M. Lang. *American Iron and Steel Institute, Preprint*, 1957, 35 p. (TS300 Am35ta Vis.)

Layout and design; electrical equipment; utilities; operations.

2698* The Story of Shot Peening. George Leghorn. *American Society of Naval Engineers, Journal*, v. 69, Nov. 1957, p. 653-666.

Machines for shot peening; types of shot used; shot peening to specifications; fatigue failures; uses of shot peening; variables.

2699 Residual Stresses as the Main Cause of Swelling of Steel Bars After Cold Drawing. M. M. Kobrin. *Henry Brutcher Translation No.* 4021, 4 p. (From *Stal'*, v. 17, no. 8, 1957, p. 754.) Henry Brutcher, Altadena, Calif.

Extent to which the total change in bar diameter on cold drawing is due to the presence of residual stresses. Role played by differences in elastic limit among steels differing in composition, with respect to amount of swell.

2700* (Russian.) Application of Liquid Propane-Butane Mixture in Metal Cutting. **Primenenie szhizhennoi propan-butanovoi smesi dlia rezki metalla.** M. Ia. Remez. *Elektricheskie Stantsii*, v. 28, no. 10, Oct. 1957, p. 79.

Advantages of mixture as a substitute for acetylene.

2701* (German.) Electrical Erosion Tooling Methods in the Mechanics Precision Industry. **Elektroerosive Bearbeitungsverfahren in der feinmechanischen Industrie.** W. Gruner. *Feingerätetchnik*, v. 6, no. 9, Sept. 1957, p. 405-409.

Advantages and disadvantages of the electric spark treatment of metals. Description of different apparatus and applications.

2702 Fabrication of a Titanium Tube Heat Exchanger. R. W. Wirta. *Hanford Atomic Products Operations (U. S. Atomic Energy Commission)*, HW-51998, Aug. 1957, 31 p. (UF767 Un3.1hw Contin.)

A prototype Ti tube heat exchanger, designed for use as a product concentrator in an acid stream, was fabricated. The development of fabrication techniques and the evaluation tests are described.

2703* (Czech.) Increase in Production of Fine Shapes and Wire in the U. S. S. R. **Intensifikace výroby jemných profilů a drátu v SSSR.** Eduard Červený. *Hutník*, v. 7, no. 10, Oct. 1957, p. 340-342.

Analysis of utilization of rolling mills for shaped products.

2704* (Polish.) The Effect of Steelworks Processes on the Formation of Fractures in Free Machining Steel Ingots During Rolling. **Wpływ pracy stalowni na pękanie wlewków stali automatowej przy walcowaniu.** Tadeusz Mazanek and Józef Koza. *Hutnik*, v. 24, no. 6, June 1957, p. 218-221.

Effect of the smelting process, ingot solidification time, time ingots are in the mold, and annealing time before the rolling process on cracks formed during rolling.

2705* (Polish.) Formation of Internal Cracks in Ingots and Blooms During the Rolling Process. **Powstawanie wewnętrznych pęknieć we wlewkach i kęsiskach podczas walcowania.** Józef Górecki. *Hutnik*, v. 24, no. 6, June 1957, p. 228-234.

Effect of the initial thickness of the ingot, the absolute pressure, and the diameter of the roll. Depth of pressure effects. Other causes and elimination of internal cracks.

2706* (Polish.) Effect of the Amount of Pressure on the Quality of Flat Blooms. **Wpływ wielkości gniotu na jakość kęsisk płaskich.** Wacław Leskiewicz. *Hutnik*, v. 24, no. 9, Sept. 1957, p. 349-355.

2707 Cross-Rolling and Annealing Textures in High-Purity Iron. Hsun Hu. *Journal of Metals*, v. 9, sec. 2; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Oct. 1957, p. 1164-1168.

Deformation and annealing textures were determined by use of an X-ray Geiger counter spectrometer. The deformation texture was predominantly (100) [011].

2708* A Threading Test for Cutting Oil Evaluation. H. A. Hartung, J. W. Johnson, and A. C. Smith, Jr. *Lubrication Engineering*, v. 13, Oct. 1957, p. 538-542.

Test involves generating a thread under regulated conditions and measuring the torque required. Equipment used is described.

2709* Cutting Fluid Performance. H. W. Husa and W. L. Bulkley. *Lubrication Engineering*, v. 13, Oct. 1957, p. 557-562.

A test method is described for the comparative evaluation of cutting fluids under typical commercial conditions. Measurements of tool-wear rate, work surface finish and cutting temperatures are used.

2710* Influence of the Machined Diameter on the Behaviour of Cutting Tools During Turning Operations. F. Eugène, B. Jugue, and R. Parran. *Microtecnic (English Ed.)*, v. 11, no. 4, 1957, p. 147-150.

Average interfacial temperature between chips and tool is higher when machining small diameters. Consequently tool wear is more rapid than when machining large diameter pieces.

2711* Grinding Wheels Are Safe. Use—Don't Abuse. G. Frank Loewy. *Modern Castings*, v. 32, Nov. 1957, p. 50-52.

Recommended safety precautions.

2712 Dimensional Etching. It's Application to Airframes. Richard H. Andrew and Jacque L. Duvall. *Plating*, v. 44, Nov. 1957, p. 1186-1190.

Chemical etching is applicable to the common alloys of airframe construction, such as those of Al, Mg, Ti, and stainless steels, and may be extended to ceramics. Process steps are described.

2713 (German.) The New Light Section and Wire Rod Mill of the Klöckner-Hüttenwerk Haspe at Hagen-Haspe. **Das neue Fein- und Drahtwalzwerk des Klöckner-Hüttenwerks Haspe in Hagen-Haspe.** Arthur Weyel and Hans Weide. *Stahl und Eisen*, v. 77, no. 21, Oct. 17, 1957, p. 1464-1476.

Survey of plant, equipment, and service.

2714 Photoetching Forms Thin Parts. *Steel*, v. 141, Nov. 18, 1957, p. 153-156.

Metal is removed with an acid. A photographic image controls the contours of the part. Method is practical only on sheets less than 0.016-in. thick.

2715* Cutting Material and Machining Costs With Power Roll Forming. E. W. Bartle. *Tool Engineer*, v. 39, Nov. 1957, p. 107-110.

Discusses blanks, workpiece material, physical properties, and applications.

2716* "Ironing" to Improve Your Product and Save Metal, Time, and Money. Carter C. Higgins. *Tooling and Production*, v. 23, Nov. 1957, p. 77-81.

Ironing is used primarily for thin walled, heavy bottom parts, or where close control of the outside and inside diameters, and the wall thickness is expected. A fine surface finish can be had while obtaining straight walls in cups, deep extruded holes, or bosses.

2717* (Russian.) Rolling as an Efficient Method for Raising the Wear Resistance of Pinions. **Obkatka rolikami kak effektivnyi metod povysheniia ustalostnoi prochnosti shesteren.** A. A. Novik and M. A. Balter. *Vestnik Mashinostroeniia*, v. 37, no. 10, Oct. 1957, p. 65-68.

As a result of the rolling process, residual strength develops on the metal surface. This strength added algebraically to the tensile strength produced in the working process of parts, decreases the cyclic amplitude, and thus increases the life of parts.

2718* (Polish.) Cleaning and Hot Peeling of Steel Ingots. **Oczyszczanie i skórowanie na goraco wlewków stalowych.** Stanisław Rytwiński. *Wiadomości Hutnicze*, v. 13, no. 10, Oct. 1957, p. 293-296.

The firing of hot steel ingots and their cutting at rolling temperature. Description of a hot ingot peeling machine.

See also: **2106** (automatic control of rolling mills); **2437** (residual stresses caused by shot-peening); **2509** (corrosion by cutting oils); **2534** (optimum ingot size for rolling mills); **2568** (automation in rolling mills); **2600** (electrically-heated soaking pit); **2667** (cold working of high-alloyed carburized steels); **2725** (carbide phase in patented steel wire).

METALS—METALLOGRAPHY, TRANSFORMATIONS, AND STRUCTURES

2719 (English.) **Superlattice Structures and Their Relationship to the Constitution Diagram in the Magnesium-Cadmium System.** A. Moore and G. V. Raynor. *Acta Metallurgica*, v. 5, no. 11, Nov. 1957, p. 601-613.

Two superlattice structures exist within the composition range 50-22 at.% Cd, an orthorhombic structure based on Mg_3Cd, and a close-packed hexagonal structure based on Mg_3Cd. Ordered alloys of intermediate composition are single phase, either orthorhombic or c.p.h., or duplex containing orthorhombic and c.p.h. structures.

2720 (English.) **The Formation of Stacking Faults in Austenite and Its Relation to Martensite.** H. M. Otte. *Acta Metallurgica*, v. 5, no. 11, Nov. 1957, p. 614-627.

The susceptibility of face-centered cubic austenite to faulting appears to increase in the presence of Cr and Mn and to be affected only a little by Ni, while the effect of C is difficult to assess. Stacking faults are not likely to be a source of nuclei for the formation of body-centered cubic martensite.

2721 The Effect of Oxygen on Zirconium-Uranium Epsilon-Phase Alloys. H. A. Saller, F. A. Rough, and A. A. Bauer. Paper from "Advances in Nuclear Engineering". v. II. Pergamon Press. 1957. p. 228-233. (TK9006 N88 Over.)

The stability of the intermediate ϵ phase of the Zr-U system was established. Pertinent data are summarized and the Zr-U constitutional diagram presented. Oxygen was found responsible for the decomposition of the ϵ phase to the α-U and α-Zr phases. Ternary Zr-U-O alloy behavior is discussed.

2722 Tabulation, Bibliography, and Structure of Binary Intermetallic Compounds. III. Compounds of Copper, Silver and Gold. H. H. Klepfer, H. E. Shoemaker, J. D. Greiner, M. L. Moller, and J. F. Smith. *Ames Laboratory (U. S. Atomic Energy Commission)*, ISC-906, Sept. 1957, 48 p. (UF767 Un3.1is Contin.)

Crystal class; lattice parameters; structure.

2723 Tempering Phenomena in Martensite. II. W. Jellinghaus. *Henry Brutcher Translation No.* 3928, 27 p. (From *Archiv für das Eisenhüttenwesen*, v. 27, no. 7, 1956, p. 440-448.) Henry Brutcher, Altadena, Calif.

The tempering of martensite was followed in the case of three plain carbon steels with 0.2, 0.4, and 0.8% C by measuring the magnetization, electrical resistance, coercive force, and volume change.

2724 Effect of Interstitial Atoms on the Self-Diffusion of Metal. M. A. Krivoglaz and A. A. Smirnov. *Henry Brutcher Translation No.* 3929, 12 p. (From "Problems of Metal Physics and Metallography", a Collection of Papers From the Metal Physics Laboratory of the Ukrainian Academy of Sciences, 1954, no. 5, p. 128-137.) Henry Brutcher, Altadena, Calif.

Considerable lowering of the energy of activation for self-diffusion of Fe in the lattice of γ-iron and exponential reduction of the pre-exponential factor in the diffusion-coefficient equation, are brought about by the addition of minute amounts of C.

2725 X-Ray Study of Carbide Phase of Patented Steel Wire. V. M. Golubkov and V. K. Kritskaia. *Henry Brutcher Translation No.* 3950, 6 p. (From "Problems of Metallography and Metal Physics" 4th Collection of Papers. State Sci. & Techn. Publishing House for Ferrous and NF Literature, Moscow, 1955, p. 461-464.) Henry Brutcher, Altadena, Calif.

X-ray determination of the dimensions of carbide particles of patented 0.80% C steel wire after various cold reductions and after tempering at different temperatures.

2726 Formation of Sigma Phase in High-Alloy Austenitic Steels and Alloys. E. M. Pivnik. *Henry Brutcher Translation No.* 3981, 11 p. (From *Fizika Metallov i Metallovedenie*, v. 2, no. 3, 1956, p. 531-537.) Henry Brutcher, Altadena, Calif.

Changes in various austenitic steels and alloys during aging at 600 to 800 C for up to 15,000 hrs. after water quenching from 1150 to 1200 C by "color transformation" metallography and X-ray spectra. Effect of σ formation on impact values and ductility, depending on composition of steel or alloy, and on size, shape, and distribution of σ particles.

2727 Mechanism of Flake Formation in Steel. V. S. Mes'kin. *Henry Brutcher Translation No.* 4010, 28 p. (From *Stal'*, v. 16, no. 8, 1956, p. 727-734.) Henry Brutcher, Altadena, Calif.

2728 Solubility of Oxygen in Manganese-Containing Liquid Iron. B. V. Linchevskii and A. M. Samarin. *Henry Brutcher Translation No.* 4030, 19 p. (From *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, no. 2, Feb. 1957, p. 9-18.) Henry Brutcher, Altadena, Calif.

2729 Effect of Carbon Upon the Solubility of Hydrogen in Liquid Iron-Carbon Alloys. K. T. Kurochkin, P. E. Nizhel'skii, and P. V. Umrikhin. *Henry Brutcher Translation No.* 4031, 17 p. (From *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1957, no. 2, Feb., p. 19-26.) Henry Brutcher, Altadena, Calif.

Solubility decreases as the C content increases to 4.3%. The H content of alloys allowed to solidify in a H atmosphere gradually increases as the C content increases to 4.3%. Above this there is a sharp increase in the H content, which is explained by the presence of graphite in these alloys.

2730 Mechanism of Action of Aluminum Upon Secondary Austenite Grain in Steel. D. S. Kamenetskaia and I. B. Piletskaia. *Henry Brutcher Translation No.* 4033, 12 p. (From "Problems of Metallography and Metal Physics", 4th Collection of Papers. State Sci. and Techn. Publishing House for Ferrous and NF Literature, Moscow, 1955, p. 103-112.) Henry Brutcher, Altadena, Calif.

Aluminum dissolved in steel facilitates nucleation of secondary austenite centers during heating and retards their growth rate. It reduces boundary and surface energies, while increasing the activation energy accompanying nucleation and growth of secondary austenite centers.

2731 Use of Tritium for Study of Behavior of Hydrogen in Metals. A. I. Chizhikov and V. K. Boyarshinov. *Henry Brutcher Translation No.* 4039, 8 p. (From *Zavodskaia Laboratoriia*, v. 23, no. 1, 1957, p. 11-14.) Henry Brutcher, Altadena, Calif.

Use as tracer for obtaining information on bond strength, diffusion, and solubility.

2732* (French.) Observation on Nitrocellulose Replicas of a Certain Type of Anisotropy of Metal Surfaces. **Observation sur répliques nitrocellulosiques d'un certain type d'anisotropie des surfaces métalliques.** Pierre-A. Jacquet. *Comptes Rendus*, v. 245, Sept. 30, 1957, p. 1129-1132.

The behavior under polarized light of surfaces of anodically oxidized Al and its alloys, and of 18/8 steel anodically treated in an oxalic acid medium was closely reproduced by the plastic imprints of these surfaces that were metallized with Al. Applications to non-destructive metallography.

2733* (French.) A Study of the Structural Changes During Deformation at High Temperature of a Stable Austenite and a Soft Iron. **Étude des modifications de structure survenant au cours de la déformation à chaud d'une austénite stable et d'un fer doux.** Ramchandra Tamhankar, Gilles Pomey, Jean Plateau, and Guy Henry. *Comptes Rendus*, v. 245, Sept. 30, 1957, p. 1132-1135 + 2 plates.

The austenite studied during creep and hot working contained 36% Ni and 10% Cr. The iron had 0.003% C. Intergranular slip, polygonization, and boundary migration were studied and related to the temperature of equicohesion.

2734 Elements of X-Ray Diffraction. B. D. Cullity. 508 p. 1956. Addison-Wesley Publishing Co., Reading, Mass. (QC481 C89e)

Fundamentals, experimental methods, and applications, with particular reference to metals and alloys.

2735* (French.) A Study of the Isothermal Transformations of Cu-Cr and Ni-Cr Castings Containing About 0.5% Mo. **Étude des transformations isothermes de fontes au Cu-Cr et Ni-Cr contenant environ 0.5% de Mo.** Albert De Sy and J. Van Eeghem. *Fonderie Belge*, 1957, no. 5, May, p. 92-105.

Seven types of casting were studied. Effects of Mo, Cu, Ni, and Cr on the position of the transformation curves. Micrographs showed the structures obtained after isothermal treatments between 250 and 700 C.

2736 A Martensitic Reaction for Uranium. A. L. Bement and W. P. Wallace. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-51084 (Rev.), June 1957, 26 p. (UF767 Un3.1hw Contin.)

Hardness measurements of specimens quenched from the $\beta \rightarrow \alpha$ phase at different cooling rates support the proposed martensitic β-α transformation for U. Relationships are calculated for hardness as a function of grain size and cooling rate,

and for grain size as a function of cooling rate. Widely varied grain structures can be produced by controlled cooling from the β-phase.

2737* (Polish.) The Brittleness of Electrotechnic Steel Plates. **Kruchość blach elektrotechnicznych.** F. Khol. *Hutnik*, v. 24, nos. 7-8, July-Aug. 1957, p. 295-299.

Electron microscope study of the structure of transformer steel sheets. Conditions for the formation of the grain boundary divisions causing brittleness.

2738 Hardness Reversion of Dilute Aluminium-Copper and Aluminium-Copper-Magnesium Alloys. R. H. Beton and E. C. Rollason. *Institute of Metals, Journal*, v. 86, Oct. 1957, p. 77-85.

Reversion of hardness in naturally aged alloys is effected by solution of the decomposition product associated with the formation of a flat in two-stage primary age-hardening curves. The minimum temperature for reversion of a given alloy is identical with the minimum temperature for single-stage age-hardening. Aluminum-copper alloys aged at 130 C, to contain G.P. [2] zones as the predominant decomposition product can be reverted by heating at higher temperatures, and after reversion, alloys re-age at room, intermediate, and higher temperatures.

2739 An Investigation Into Some Ageing Characteristics of Lead-Antimony Alloys, With Particular Reference to the Effect of Strain. E. J. Hooker. *Institute of Metals, Journal*, v. 86, Oct. 1957, p. 98-107.

Lead alloys containing up to 0.88% Sb were strained by amounts up to 10% after solution-treatment and the progress of aging at room temperature, 100, and 150 C determined by means of hardness measurements.

2740 The Ageing Characteristics of Ternary Aluminium-Zinc-Magnesium Alloys. I. J. Polmear. *Institute of Metals, Journal*, v. 86, Nov. 1957, p. 113-121.

Alloys with basic Zn contents of 4, 6, and 8% and Mg contents within the range 0-3% were studied over the temperature range −20 to +240 C.

2741 The Recrystallization Process in Tungsten as Influenced by Impurities. R. A. Swalin and A. H. Geisler. *Institute of Metals, Journal*, v. 86, Nov. 1957, p. 129-134.

Special impurity additions were investigated by electron-microscopic and neutron-diffraction techniques.

2742 Aluminium-Rich Alloys of the Quaternary System Aluminium-Iron-Copper-Nickel. G. V. Raynor and B. J. Ward. *Institute of Metals, Journal*, v. 86, Nov. 1957, p. 135-144.

The constitution of the system was examined in the solid state by metallographic, X-ray-diffraction, and electrode-potential measurements. In the range studied, the Al-rich solid solution may be in equilibrium with $CuAl_2$, with the ternary compound T(FeCu), or with the ternary compound T(NiCu). By extrapolation at total solute concentrations of 10 and 15 wt.%, the compound T(FeCu) is shown to be capable of dissolving Ni up to a limit of approximately 6.8 wt.%. Experiments with slowly cooled alloys permitted pure samples of T(FeCu), T(NiCu), and T(FeNi) to be prepared from the appropriate ternary systems and the quaternary system. The compositions $FeCu_2Al_7$ and $NiCu_2Al_7$ were confirmed, showing that the Fe atoms could be replaced by Ni atoms, at least up to a Ni content of 6.5 wt.%. The solubility of Fe in T(NiCu) is only about 0.8 wt.%.

2743 The Effect of Hydrogen Upon Martensite Formation in Low-Alloy Steels. R. Kumar and A. G. Quarrell. *Iron and Steel Institute, Journal*, v. 187, Nov. 1957, p. 195-204.

The effect of H is dependent on C content. This may be due to a strong interaction between the H and C atoms, which tends to prevent clustering of the latter and so reduces the chances that carbon-free regions of austenite, which may serve as embryos for martensite formation, may occur.

2744 An Investigation of Nitride Precipitates in Pure Iron and Mild Steels. G. R. Booker, J. Norbury, and A. L. Sutton. *Iron and Steel Institute, Journal*, v. 187, Nov. 1957, p. 205-215.

Two types of precipitate were observed, and their plate-like nature demonstrated. The large precipitate is identified as γ'-Fe_4N; the smaller is α''-$Fe_{16}N_2$ which forms with the plane of the plate parallel to its (001) crystallographic planes.

2745* (Russian.) Character of Non-Variant Transformation in the Aluminum-Titanium System. **O kharaktere nonvariantnogo prevrashcheniia v sisteme aliuminii-titan.** N. N. Glagoleva, V. M. Glazov, and G. A. Korol'kov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1957, no. 8, Aug., p. 89-94.

Determination of the nature of non-variant equilibrium and Ti solubility in Al in the solid state at various temperatures.

2746 Dislocation Arrays in Germanium. W. W. Tyler and W. C. Dash. *Journal of Applied Physics*, v. 28, Nov. 1957, p. 1221-1224.

Dislocation arrays were observed in deformed Ge, using a technique based on the selective etching of Li precipitates which prefer to nucleate on or near dislocations.

2747 Hillocks, Pits, and Etch Rate in Germanium Crystals. Boris W. Batterman. *Journal of Applied Physics*, v. 28, Nov. 1957, p. 1236-1241.

Symmetric, faceted etch hillocks were observed on certain Ge surface orientations exposed to an H_2O_2-HF etchant. Considerations of surface curvature and etch rate lead to the conclusion that the faces bounding the hillocks must be at saddle points on an etch rate vs. orientation surface.

2748 Stability of AISI Alloy Steels. A. B. Wilder, E. F. Ketterer, and D. B. Collyer. *Journal of Metals*, v. 9, sec. 2; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Oct. 1957, p. 1176-1181.

A study of changes in microstructure observed in typical AISI constructional alloy steels in the welded and unwelded conditions after exposure for 34,000 hrs. at 900 and 1050 C and in several instances 1200 F. Tensile and creep rupture properties after exposure for 10,000 hrs. were also evaluated.

2749 Mechanism of Precipitation in a Cu-2.5 Pct Fe Alloy. J. B. Newkirk. *Journal of Metals*, v. 9, sec. 2; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Oct. 1957, p. 1214-1220.

The precipitation process was studied experimentally by means of X-ray diffraction and hardness measurements and light and electron microscopic observations. It was concluded that γ-Fe and α-Fe precipitate simultaneously, γ-Fe dominating in the early stages. During later stages, the particles of γ-Fe dissolve, providing the Cu lattice with Fe atoms which diffuse to the more stable α-Fe particles. The α-Fe particles continue to grow until all evidence of the γ-Fe is gone.

2750 Phase Transformations in Hypoeutectoid Ti-Cr Alloys. H. I. Aaronson, W. B. Triplett, and G. M. Andes. *Journal of Metals*, v. 9, sec. 2; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Oct. 1957, p. 1227-1235.

The morphologies and mechanisms of the proeutectoid α and eutectoid reactions were investigated in an iodide Ti-7.22% Cr alloy in the temperature range between 725 and 550 C; supplementary studies were performed on the eutectoid reaction in specimens of a sponge Ti-10.94% Cr alloy reacted at 650 C.

2751 Distribution of Boron in Gamma Iron Grains. R. M. Goldhoff and J. W. Spretnak. *Journal of Metals*, v. 9, sec. 2; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Oct. 1957, p. 1278-1283.

Boron undergoes positive adsorption to γ-iron grain boundaries; the temperature coefficient of adsorption is positive.

2752* (English.) **An Investigation on the Titanium-Iron-Carbon System.** Yōtarō Murakami, Hirozō Kimura, and Yoshio Nishimura. *Kyoto University, Memoirs of the Faculty of Engineering*, v. 19, no. 3, July 1957, p. 302-324.

The solid solubility ranges in the two intermetallic compounds TiFe and $TiFe_2$, of the Ti-Fe binary system and phase relationships of the Ti-Fe-C system were studied by microscopic examination, melting point determination, and X-ray analysis.

2753* (Russian.) Formation of Graphites in Cast Iron During Crystallization and Thermal Treatment. **Obrazovanie grafita v chugunakh pri kristallizatsii i termicheskoi obrabotke.** K. P. Bunin. *Liteinoe Proizvodstvo*, 1957, no. 10, Oct., p. 15-19.

2754* (Russian.) Phase Conditions and Intracrystalline Liquation in Fe-C-Si Alloys. **Fazovye sostoiannia i vnutrikristallicheskaia likvatsiia v Fe-C-Si splavakh.** Ia. N. Malinochka. *Liteinoe Proizvodstvo*, 1957, no. 10, Oct., p. 19-22.

Analysis of the phase conditions in Fe-C-Si alloys at different temperatures.

2755* (Russian.) On the Transformation of Cementite Into Austenite and Ferrite During Graphitization and Decarbonization of Cast Iron. **O prevrashchenii tsementita v austenit i ferrit pri grafitizatsii i obezuglerozhivanii chuguna.** K. P. Bunin and S. N. Ivanov. *Metallovedenie i Obrabotka Metallov*, 1957, no. 10, Oct., p. 2-4.

Composition of the investigated hypoeutectic cast iron is: 3.12% C, 0.49% Si, 0.38% Mn, 0.44% P, 0.008% S, and 0.062% Mg.

2756* (Russian.) On the Crystallization of Hypereutectic Gray Magnesium Iron. **O kristallizatsii zaevtekticheskogo serogo magnievogo chuguna.** A. V. Chernovol. *Metallovedenie i Obrabotka Metallov*, 1957, no. 10, Oct., p. 21-22.

The formation and growth of graphite in hypereutectic cast iron in the eutectic transformation process is the same as that in hypoeutectic and eutectic Mg cast iron.

2757 The Extraction of Minor Phases From Austenitic Steel. J. F. Brown, W. D. Clark, and A. Parker. *Metallurgia*, v. 56, no. 337, Nov. 1957, p. 215-223.

The preferred technique uses 1090 HCl in alcohol as electrolyte. The presence of Cr_3C_2 in 18/8/Ti and 18/8/Nb steels after reheating at 600-700 C is demonstrated.

2758* (German.) Analyses of the Partial Systems: Aluminum-$TiSi_2$,- $ZrSi_2$,- $MoSi_2$, and- WSi_2. **Untersuchungen der Teilsysteme: Aluminium-$TiSi_2$, -$ZrSi_2$, -$MoSi_2$, und -WSi_2.** H. Nowotny and H. Huschka. *Monatshefte für Chemie*, v. 88, no. 4, 1957, p. 494-501.

The reaction of high-melting silicides with Al is studied by analyzing the fundamental structure of quenched alloys within the range of Al-Si-$MeSi_2$ (Me = Ti, Zr, W).

2759 Electron Diffraction From Crystals Containing Stacking Faults. II. M. J. Whelan and P. B. Hirsch. *Philosophical Magazine*, v. 2, ser. 8, no. 23, Nov. 1957, p. 1303-1324 + 8 plates.

Electron optical experiments on thin stainless steel foils.

2760 The Solution of Inert Gas Atoms in Metals. D. E. Rimmer and A. H. Cottrell. *Philosophical Magazine*, v. 2, ser. 8, no. 23, Nov. 1957, p. 1345-1353.

Estimates are made of the energies of interstitial and substitutional solutions of inert gas atoms in a simple metal. The loss of cohesion round such an atom is taken into account by regarding the atom as occupying a vacancy in the metal.

2761 Indium-Rich Indium-Magnesium and Indium-Lithium Alloys. J. Graham and G. V. Raynor. *Philosophical Magazine*, v. 2, ser. 8, no. 23, Nov. 1957, p. 1354-1363.

Lattice spacing measurements show that neither Mn nor Li cause a marked axial ratio decrease.

2762 The Band Structure of the Transition Metals. N. F. Mott and K. W. H. Stevens. *Philosophical Magazine*, v. 2, ser. 8, no. 23, Nov. 1957, p. 1364-1386.

Band structures and their relation to electrical and magnetic properties.

2763 Sputtering Yields for Normally Incident Hg^+-Ion Bombardment at Low Ion Energy. Gottfried K. Wehner. *Physical Review*, v. 108, ser. 2, Oct. 1, 1957, p. 35-45.

Sputtering yields for 26 metals were measured in the energy range 30 to 4000 e.v. The highest yields were obtained with Cu, Ag, and Au; the lowest V, Zr, Nb, Si, and C.

2764 Solubility of Lithium in Germanium. E. M. Pell. *Physics and Chemistry of Solids*, v. 3, nos. 1-2, 1957, p. 74-76.

The solubility of Li in Ge reaches a maximum atom fraction of $(1{\cdot}7 \pm 0{\cdot}5)\times10^{-4}$ at about 800 C. The distribution coefficient has a value of $(1{\cdot}6$ to $2{\cdot}0)\times10^{-3}$ at the melting point. Lithium and Ge form the compounds $Li_{15}Ge_4$ and $Li_{22}Ge_5$, the former having a melting point of 750 ± 10 C and the latter a melting point of 800 ± 10 C.

2765 Electrolysis of Copper in Solid Silicon. C. J. Gallagher. *Physics and Chemistry of Solids*, v. 3, nos. 1-2, 1957, p. 82-86 + 2 plates.

Copper diffuses in Si at 1100 C with a positive charge. At least 35% of the dissolved Cu can diffuse rapidly, and more than 60% of this fraction is positively charged.

2766* (French.) Generalization of the Electrolytic Buffer in Metallography; Anodic Oxidation of Light Metals. **Généralisation du tampon électrolytique pour la métallographie; cas de l'oxydation anodique des métaux légers.** P. A. Jacquet. *Recherche Aéronautique*, 1957, no. 60, Sept.-Oct. 1957, p. 57-60.

Application of the buffer method developed for anodic polishing of metallic materials to processes used to bring out some structural properties, especially in the case of Al and its alloys.

2767* (English.) **Activities of Manganese and Carbon in Fe-C-Mn Melts.** Masayasu Ohtani. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 9, no. 5, Oct. 1957, p. 426-433.

The solubility of C in Fe-C-Mn melts is measured at 1,530 ± 10 C up to Mn = 40%. Activities of Mn and C in these melts are determined at 1,540 C in the range of $O < Mn < 40\%$, and $O < C <$ sat. Activities of Mn and C decrease gradually on the addition of C and Mn respectively.

2768* (French.) Study of Tempered Carbides of Martensite by Means of Thermomagnetic Analysis and X-Ray Diffraction. **Étude par analyse thermomagnétique et par diffraction des rayons X des carbures de revenu de la martensite.** F. Marion and S. Mathieu. *Société Chimique de France, Bulletin*, 1957, no. 10, Oct., p. 1275-1279.

The carbides obtained between 150 and 400 C contain an excess of Fe in comparison with cementite. These carbides possess a Curie point between 200 and 250 C, and rapidly decompose into Fe and cementite above 300 C.

2769* (Norwegian.) Solid Bodies, Dislocations, and Material Testing. **Faste legemer, dislokasjoner og material provning.** Alf Taraldsen. *Teknisk Ukeblad*, v. 104, Oct. 17, 1957, p. 847-853.

Solid state physics; internal demensions of dislocations; real and theoretical forces; microstructure. Application to metallic materials.

2770* (German.) New Observations on Dislocations in Germanium. **Neue Beobachtungen an Versetzungen in Germanium.** Heinz Dorendorf. *Zeitschrift für Angewandte Physik*, v. 9, no. 10, Oct. 1957, p. 513-519.

Description and measurement of dislocations in Ge single crystals. Formation by plastic deformation of a solid crystal after thermal stresses.

2771* (German.) A Contribution to the Knowledge of the Manganese-Nitrogen System. **Zur Kenntnis des Systems Mangan/Stickstoff.** Robert Juza, Heinrich Puff, and Friedrich Wagenknecht. *Zeitschrift für Elektrochemie*, v. 61, no. 7, 1957, p. 804-809.

Determination of phase boundaries in preparations tempered at 1000, 800, 600, and 400 C and quenched. X-ray, thermomagnetic, and magnetization studies were made.

2772* (German.) Ferrimagnetism of Mn_4N and of Some Mixed Crystals of Mn_4N. **Ferrimagnetismus des Mn_4N und einiger Mischkristalle des Mn_4N.** Robert Juza and Heinrich Puff. *Zeitschrift für Elektrochemie*, v. 61, no. 7, 1957, p. 810-819.

Proves the existence of ferrimagnetism in Mn_4N. Production of preparations from Mn_4N, with vacancies in the partial nitrogen lattice. Lattice constants increased with decrease of the number of vacancies in the specimen.

2773* (Russian.) Electrodiffusion in Potassium-Sodium Alloys. **Elektrodiffuziia v splave kalii-natrii.** S. I. Drakin and A. K. Mal'tsev. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 9, Sept. 1957, p. 2036-2041.

A new method is based on the determination of the specific resistance in various regions of the alloy, so that the composition of the alloy in these regions can be determined quickly without interrupting the process.

See also: **2406** (electron diffraction analysis); **2556** (crystal orientation in temperature-gradient zone-melting); **2638** (effect of structure on fatigue strength); **2647** (aging of Al-Cu alloys); **2655** (grain size and tensile deformation of Al); **2657** (transformation kinetics of Zn-Mo alloys); **2661** (microstructure of U-Ti alloys); **2671** (structure of Be); **2681** (formation of slip bands); **3086** (diffusion in Cu welds); **3087** (transformation in resistance-welded steel).

METALS—POWDER

2774 (English.) **The Mechanism of Sintering of Copper.** B. H. Alexander and R. W. Balluffi. *Acta Metallurgica*, v. 5, no. 11, Nov. 1957, p. 666-677.

Specimens consisted of a multi-layered winding of fine Cu wires on a larger Cu spool where changes in the size and shape of the voids could be observed. Shrinkage in all stages is primarily due to the volume diffusion of atoms from grain boundary sources to the voids. During the initial stages of sintering bonding occurs by this mechanism and also by volume diffusion between differently curved free surfaces of the voids.

2775 Properties of Some Refractory Uranium Compounds. M. Jack Snyder and Winston H. Duckworth. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-1223, Sept. 1957, 33 p. (UF767 U3b Contin.)

Methods of preparing some refractory U compounds and of sintering them to high densities are described. Thermal-expansion coefficients, specific heats, microhardnesses, and rates of reaction with O and N are given for the silicides and UAl_2. Preparation of UAl_3, UN, and UBe_{13} is included.

2776 Use of Electron Diffraction for the Study of Oxide Films on the Surface of Cemented Carbides. K. P. Imshennik and V. A. Landa. *Henry Brutcher Translation No.* 4041, 5 p. (From *Zavodskaia Laboratoriia*, v. 23, no. 6, 1957, p. 699-702.) Henry Brutcher, Altadena, Calif.

Proof of presence of TiO_2 on as-delivered and on oxidized surfaces of tool tips high in TiC, and of WO_3 on surfaces of oxidized specimens low in, or containing no, TiC. Recommended method for removing TiO_2 from tips before brazing them onto tool shanks.

2777 Sweden: Iron Powder to Rolled Steel in One Operation. Bo Kalling, Sven Eketorp, and Sven Backstrom. *Journal of Metals*, v. 9, Nov. 1957, p. 1440-1444.

Granulated pig iron is decarburized with iron oxide, and the low-carbon product is rolled directly to compact steel.

2778* (Italian and French.) Physical and Mechanical Properties of Sintered Parts. **Proprietà fisiche e meccaniche dei corpi sinterizzati.** M. Eudier and B. Hocheid. *Metallurgia Italiana*, v. 49, no. 8, Aug. 1957, p. 573-580.

Distribution of stresses around a spherical hollow placed in a definite solid and the determination of the physical properties of a sintered body. Variation of properties as a function of density.

2779* (Italian and French.) S. A. P. Sintered Aluminum With High Resistance to Heat. **S. A. P. L'alluminio sinterizzato ad alta resistenza al calore.** R. Irmann. *Metallurgia Italiana*, v. 49, no. 8, Aug. 1957, p. 605-611.

Properties of cast or sintered, pure or alloyed (Al-Cu-Ni-Mg), S. A. P. aluminum. Effect of the thickness of the particles and of the oxide content or the spacing of the oxide films on the resistance to rupture. Effect of the amount of reduction during extrusion.

2780 Vacuum Sintering. II. Henry H. Hausner. *Precision Metal Molding*, v. 15, Nov. 1957, p. 91 + 3 pages.

Effect of sintering atmosphere on porosity and pore migration; the infiltration process; metal ceramic combinations. (To be concluded.)

2781 Titanium Carbide. J. C. Redmond. *Product Engineering*, v. 28, Nov. 11, 1957, p. 84-86.

Metal binders in TiC give better ductility and increased resistance to thermal fatigue. Performance data; design factors; applications.

See also: **2178** (electrolytic production of Cd powder); **2179** (electrolytic production of Fe powder); **2658** (study of Cu-silica and Cu-alumina alloys).

NONDESTRUCTIVE TESTING AND QUALITY CONTROL

2782 Measurement of Adhesive Moduli. The Use of Ultrasonics to Measure the Dynamic Modulus of Metal-to-Metal Adhesive Joints. P. F. Tapp, A. Broodo, C. E. Horn, and S. V. Castner. *Aircraft Engineering*, v. 29, Nov. 1957, p. 350-352.

2783 Ultrasonic Testing of Aluminum Alloys. William L. Fink. *American Society for Testing Materials, Preprint No.* 74, 1957, 6 p. (TA401 Am35p Vis.)

Standardization of ultrasonic testing procedures and instruments. Types of discontinuities most commonly encountered. Effect of discontinuities on properties.

2784 An Evaluation of Geiger Counter X-Ray Techniques for Measuring Stresses in Hardened Steels. Karl E. Beu. *American Society for Testing Materials, Preprint No.* 83, 1957, 8 p. (TA401 Am35p Vis.)

2785 A Review of Sonic Methods for the Determination of Mechanical Properties of Solid Materials. C. E. Kesler and T. S. Chang. *ASTM Bulletin*, 1957, no. 225, Oct., p. TP190-TP196.

2786* (Polish.) The Magnetic Sound and Its Application to the Testing of Ferromagnetic Material. **Sonda magnetyczna i jej zastosowanie do badania ferromagnetyków.** A. Stryk. *Hutnik*, v. 24, nos. 7-8, July-Aug. 1957, p. 328-332.

Principle and application to the measurements of coercive intensity, to the investigation of magnetic anisotropy, and to the detection of material discontinuities.

2787 (German.) Automatic Testing of Billets With Electromagnetic and Ultrasonic Methods. **Automatische Prüfung von Knüppeln mit elektromagnetischen und Überschall-Verfahren.** Vladimir Husarek. *Stahl und Eisen*, v. 77, no. 21, Oct. 17, 1957, p. 1483-1487.

Description of an experimental plant for testing steel billets simultaneously by electromagnetic and ultrasonic testing methods.

See also: **2580** (statistical control in the foundry).

NUCLEAR PHYSICS, NUCLEONICS, AND RADIATION

2788 Advances in Nuclear Engineering. John R. Dunning and Bruce R. Prentice, editors. v. I-II. 523 and 581 p. 1957. Pergamon Press, New York. (TK9006 N88 Over.)

Includes papers on fuel cycles; plant containment concepts and design; plant components; waste disposal; protection and safety measures; radiation processing; reactor design, operation, and maintenance; metallurgy; natural resources; instrumentation; heat transfer; standardization.

2789 An Evaluation of Heavy Water Reactors for Power. D. P. Herron, W. H. Newkirk, and A. Puishes. *American-Standard, Atomic Energy Division (U. S. Atomic Energy Commission)*, ASAE-S-3, Oct. 1957, sections individually paged. (UF767 Un3.1as Contin.)

Natural vs. enriched U in heavy water reactors; selection of reactor designs; core design; comparison of heavy water reactor economics with other types.

2790* (French.) The Detection of Nuclear Particles. Ionization Chambers and Counters. **La détection des particules nucléaires. Chambers d'ionisation et compteurs.** Daniel Blanc. *Âge Nucléaire*, 1957, no. 6, Sept.-Oct., p. 53-59.

History, definitions, types, and applications.

2791* (French.) A Contribution to the Study of the Effects of Exchange Currents in the Photodisintegration of a Deuteron. **Contribution a l'étude des effets de courants d'échange dans la photodésintégration du deutéron.** P. Meyer. *Annales de Physique*, v. 2, ser. 13, nos. 7-8, July-Aug. 1957, p. 498-550.

Calculations based on field quantum theory.

2792* (English.) **Nuclear Radiation. Techniques for Radioactivity Measurements.** *Annals of the International Geophysical Year*, v. 4, pts. 1-3, 1957, p. 7-17.

Measurement of: particulate airborne fission products at ground level and high altitudes; deposition of fission product activity; natural radioactivity of the air; total fission products and radiocarbon in sea-water.

2793* (German.) Scintillation Spectrometer for Gamma Radiation. **Szintillations-Spektrometer für Gammastrahlung. I.** Kurt Jordan. *Archiv für Technisches Messen*, 1957, no. 260, Sept., p. 193-196.

Spectroscopy of γ-radiation in an energy range of a few k.e.v. up to 10 m.e.v. Transformation of the γ-quanta to electrical impulses when coming out of the photomultipliers. Absorption of γ-radiation in NaI crystals.

2794 A Measurement of the Transfer Function of a Fast Critical Assembly. J. F. Boland, R. R. Smith, and R. E. Rice. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5782, Sept. 1957, 16 p. (UF767 Un3.1an Contin.)

The zero power transfer function of the ZPR-III mockup assembly of EBR-I, Mark III was obtained over a frequency range from 0.01 to 10 c.p.s. Various oscillator rod materials and shapes were investigated.

2795 Performance and Potential of Natural Circulation Boiling Reactors. W. S. Flinn and M. Petrick. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5720, Oct. 1957, 46 p. (UF767 Un3.1an Contin.)

Graphs show interrelationships of power and average core coolant density, core and riser height, channel hydraulic diameter, recirculation flow rate, exit steam volume fraction, and system pressure.

2796 Papers Presented at the Technical Briefing Session Held at Argonne National Laboratory, May 27 and 28, 1957. Boiling Water Reactor Program. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, TID-7535, Oct. 1957, 161 p. (UF767 Un3ti Contin.)

Reactor design, fabrication, and instrumentation; safety provisions; economic aspects; fuel elements.

2797* (Russian.) Formation of Na^{24} and P^{32} During Interaction of High-Energy Protons With Complex Nuclei. **Obrazovanie Na^{24} i P^{32} pri vzaimodeistvii protonov vysokoi energii so slozhnymi iadrami.** A. K. Lavrukhina, L. P. Moskaleva, L. D. Krasavina, and I. M. Grechishcheva. *Atomnaia Energiia*, v. 3, no. 10, Oct. 1957, p. 285-290.

Study of the formation of Na^{24} and P^{32} nuclei during the bombardment of Cu, La, Au, and Th with protons having energies from 120 to 660 m.e.v.

2798* (Russian.) Measuring the Absolute Intensity of Neutron Sources by Comparison With the T(d,n)He^4 Reaction. **Izmerenie absoliutnoi intensivnosti neitronnykh istochnikov sravneniem s reaktsiei T(d,n)He^4.** N. N. Flerov and V. M. Talyzin. *Atomnaia Energiia*, v. 3, no. 10, Oct. 1957, p. 291-297.

Description of measuring method using a sensitive graphite-prism detector.

2799* (Russian.) Studying the Use of Gas-Discharge Counters in Pulsed-Operation System. **Issledovanie raboty gazoraziadnykh schetchikov v rezhime upravliaemogo impul'snogo pitaniia.** V. V. Vishniakov and A. A. Tiapkin. *Atomnaia Energiia*, v. 3, no. 10, Oct. 1957, p. 298-307.

Evaluation of performance of argon-methylal and halogen counters.

2800* (German.) The Instrumentation of Nuclear Reactors. **Instrumentenausrüstung für Kernreaktoren.** Denis Taylor. *Atomwirtschaft*, v. 11, Oct. 1957, p. 308-312.

Control and safety instruments, and those required to obtain information about prevailing local conditions. A typical instrumentation layout for radiation protection.

2801 U. S. Research Reactors. J. W. Chastain, editor. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, TID-7013, Aug. 1957, 73 p. (UF767 Un3ti Contin.)

A compact summary of technical information on the major types of research reactors developed in the U. S.

2802 Reactor Chemistry and Plant Materials. *Bettis Technical Review (U. S. Atomic Energy Commission)*, v. 1, Aug. 1957, 142 p. (UF767 Un3.1wa Contin.)

Developments in corrosion technology, decontamination, analytical instrumentation, materials application, and welding and brazing are reported.

2803 Proceedings of the Brookhaven Conference on Resonance Absorption of Neutrons in Nuclear Reactors. *Brookhaven National Laboratory (U. S. Atomic Energy Commission)*, BNL 433 (C-24), Sept. 1956, 130 p. (UF767 Un3.1bn Contin.)

2804* (French.) Spectrum of γ-Rays Caused by Inelastic Scattering of 2.5 m.e.v. Neutrons in Iron. **Spectre des rayons γ dus a la diffusion inélastique dans le fer des neutrons de 2,5 MeV.** Philippe Éberhard, Jagadish Garg, and Bèchir Torki. *Comptes Rendus*, v. 245, no. 17, Oct. 21, 1957, p. 1415-1418.

Spectrum was measured with a NaI(Tl) crystal. Energy values found were 0.845, 1.25, 1.40, 1.70, 1.83, and 2.15 m.e.v.

2805 A Conceptual Design Study of an Advanced Engineering Test Reactor. *Curtiss-Wright Corporation (U. S. Atomic Energy Commission)*, CWR-464 (Del.) May 1957, 57 p. (UF767 Un3.1cw Contin.)

Design based upon cylindrical geometry, using solid fuel in a heavy-water-moderated core.

2806* (Russian.) Experimental Investigations of α-Decay of Medium Atomic Weight Elements. **Eksperimental'nye issledovaniia al'fa-raspada elementov srednego atomnogo vesa.** Iu. A. Surkov. *Doklady Akademii Nauk SSSR*, v. 115, no. 5, Aug. 11, 1957, p. 904-906.

Nuclear reactions resulting in bombardment of Er, Yb and Hf with 660 m.e.v. protons.

2807 IBM 650 Routine II. Neutron Energy Spectra in Water. Julius C. English. *E. I. du Pont De Nemours & Co., Savannah River Laboratory Technical Division (U. S. Atomic Energy Commission)*, DP-222, July 1957, 44 p. (UF767 Un3.1dp Contin.)

An IBM 650 program is given for the computation of neutron energy spectra in homogeneous reactors moderated by heavy water or by light water.

2808 Gamma-Ray Monitor Has High Reliability. J. M. Jackson and J. J. Suran. *Electronics*, v. 30, Nov. 1, 1957, p. 170-174.

Transistorized instrument detects γ-radiation over 1 to 1,000 mr. per hr. range with accuracy of $\pm$ 40%. All active circuits, except for power supply, are mutivibrators.

2809 Critical Geometries for Bare Cylinders. J. A. Pond. *Goodyear Atomic Corporation (U. S. Atomic Energy Commission)*, GAT-189, July 1956, 23 p. (UF767 Un3.1ga Contin.)

Two-group treatment for aqueous solutions of uranyl fluoride. Interaction between cylindrical reactors.

2810 The Fast Flux Distribution in an Empty Process Tube for Various Sizes of Graphite Reactor Lattice. J. Martin Tobin. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-51751, Aug. 1957, 23 p. (UF767 Un3.1hw Contin.)

2811 Thermal Utilization, Thermal Flux, and Lattice Cell Shape. H. Neumann. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-52048, Aug. 1957, 50 p. (UF767 Un3.1hw Contin.)

Quantitative criteria are established to show that the propagated effect of a fuel rod in a lattice will be cylindrically symmetric if the lattice symmetry is high, if the lattice spacing is small compared with the moderator diffusion length, or if the fuel rod diameter is small compared with the lattice spacing. One or more of these conditions are ordinarily well met for heavy water and graphite lattices and for filled hexagonal (sixty-degree rhombic) light water lattices.

2812* The Swiss Neuclear Induction Spectrometer. C. R. Theiler. *Instrument Practice*, v. 11, Oct. 1957, p. 1050-1052.

Nuclear research instrument provides means for rapid qualitative and quantitative analysis of organic substances with samples of a few mg.

2813 The Independent Yields of ^{140}La, ^{90}Y, and ^{91}Y in the Thermal Neutron Fission of ^{235}U and ^{233}U. W. E. Grummitt and Gwen M. Milton. *Journal of Inorganic and Nuclear Chemistry*, v. 5, no. 2, 1957, p. 93-104.

2814 Molecular Dissociation Following Radioactive Decay: Tritium Hydride. Arthur H. Snell, Frances Pleasonton, and H. E. Leming. *Journal of Inorganic and Nuclear Chemistry*, v. 5, no. 2, 1957, p. 112-117.

When radioactive decay takes place in the TH molecule, the resulting $(He^3H)^+$ ion shows a strong tendency to remain bound. When dissociation does take place, the electrons most commonly divide one with each nucleus, rather than both going either with the He^3 fragment or with the H fragment.

2815 A Theoretical Study of Stability in Water Flow Through Heated Passages. H. Chilton. *Journal of Nuclear Energy*, v. 5, nos. 3-4, 1957, p. 273-284.

A general method is derived for predicting stability criteria for a system with any form of variation of heat input with respect to passage length. Criteria and integrated functions are presented for the forms of heat-input distribution commonly encountered in reactor design.

2816 The Formation of Internal Gas Bubbles in Solids. R. S. Barnes. *Journal of Nuclear Energy*, v. 5, nos. 3-4, 1957, p. 301-319 + 2 plates.

Gas bubbles produced internally in polymethyl methacrylate by heating or by irradiation were studied. Results are used to discuss the physics of the nucleation of gas bubbles in solids, and in particular the swelling which occurs in U upon irradiation with neutrons.

2817 Measurement of Neutron Spectra in Moderators and Reactor Lattices. I. Aqueous Moderators. M. J. Poole. *Journal of Nuclear Energy*, v. 5, nos. 3-4, 1957, p. 325-341.

Application of pulsed source time-of-flight techniques. Measurements on the spectrum in water loaded with boric acid.

2818 The Total Effective Cross-Sections of ^{233}U, ^{235}U, ^{239}Pu and the Fission Cross-Section of ^{235}U in the Resonance Region. V. V. Sokolovsky, V. V. Vladimirsky, I. A. Radkevich, and A. A. Panov. *Journal of Nuclear Energy*, v. 5, nos. 3-4, 1957, p. 389-401. (Translated from *Atomnaia Energiia*, v. 2, 1957, p. 129.)

2819* A Determination of the Gamma-Ray Emission of Radium. Frank H. Attix and Victor H. Ritz. *Journal of Research, National Bureau of Standards*, v. 59, Nov. 1957, p. 293-305.

An average value of 8.26 ± 0.05 r per mg. hr. at 1 cm. was found.

2820 Pile Oscillator Techniques and the Error Analysis of Oscillator Measurements. F. Feiner, R. T. Frost, and H. Hurwitz, Jr. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1703, Oct. 1956, 38 p. (UF767 Un3.1ka Contin.)

Experimental equipment, measuring techniques, and methods of analysis. Derivation of expressions for the signal-to-noise ratio of oscillator measurements.

2821 Environmental Hazard Evaluations for Critical Assemblies. J. J. Fitzgerald and R. J. Feinberg. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1787, Dec. 1956, 33 p. (UF767 Un3.1ka Contin.)

Criteria for evaluating critical assembly hazards and site selection.

2822 Review of the Joint AECL-KAPL Studies of the Transuranium Elements. J. P. Butler, et al. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1781, July 1957, 40 p. (UF767 Un3.1ka Contin.)

Properties of Pu, Am, Cm, Bk, Cf, E, and Fm isotopes.

2823 The Fast Oxide Breeder—Fuel Irradiation Experiments. W. M. Cashin. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1784, Aug. 1957, 22 p. (UF767 Un3.1ka Contin.)

A fuel concept applicable to a fast breeder reactor is described. Mixed PuO_2-UO_2 fuel elements were irradiated. Central void formation was observed, but no settling of the fuel occurred.

2824 Beryllium - Reflected, Graphite - Moderated Critical Assemblies. G. E. Hansen, J. C. Hoogterp, J. D. Orndoff, and H. C. Paxton. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission)*, LA-2141, Oct. 1957, 61 p. (UF767 U3La Contin.)

Data on properties of three sets of cylindrical assemblies that have been set up in the "Honeycomb" machine.

2825* (Hungarian.) The Distribution of Protons and Neutrons in Heavy Nuclei. **Protonek és neutronok eloszlása nehéz magokban.** Erzsébet Rupp. *Magyar Fizikai Folyóirat*, v. 5, no. 3, 1957, p. 183-186.

Distribution of nucleons on the basis of the shell model.

2826* (Hungarian.) Cross Cut Effect of the Nuclear Reaction of I^{127} (γ,n) I^{126}. **A $J^{127}(\gamma,n)$ J^{126} magreakció hatáskeresztmetszete.** János Erő and Lajos Keszthelyi. *Magyar Fizikai Folyóirat*, v. 5, no. 4, 1957, p. 301-310.

Radiation of a NaI (Tl) crystal by the γ quanta of the Li (p,γ) reaction. The cross cut effect of the nuclear reaction of I^{127} (γ,n) I^{126} was determined by evaluating the number of scintillations and the activity of the I^{126} nuclei produced in the crystal.

2827* (Hungarian.) Relativistic Mass Equation of Spinning Particles. **Spinnel rendelkező részecskék relativisztikus mozgásegyenlete.** Károly Nagy. *Magyar Fizikai Folyóirat*, v. 5, no. 4, 1957, p. 311-324.

From the tensor contravariant, the translation and velocity equations relative to the spin were calculated. Application to the velocity equation of an electron by means of the magnetic moment and spin.

2828* (Hungarian.) Emulsions for Nuclear Physics. **Atommagfizikai emulziók előhívása.** Ernő Bujdosó and László Medveczky. *Magyar Fizikai Folyóirat*, v. 5, no. 4, 1957, p. 353-361.

Description of equipment for the preparation of nuclear emulsions. Production of 200μ-thick Agfa K2 emulsion.

2829 Experimental Determination of the Radiation Decomposition of Boron-10 Enriched Boron Trifluoride and the Resultant Corrosion of the Containing Materials. W. K. McCarty. *North American Aviation, Inc. (U. S. Atomic Energy Commission)*, NAA-SR-1999, Oct. 1957, 32 p. (UF767 Un3.1na Contin.)

Aluminum capsules containing metal specimens were filled with boron-10 enriched BF_3 and irradiated in the MTR. Post-irradiation measurements determined the extent of radiolysis of the BF_3 and the extent of corrosion of the specimens.

2830* Remote Handling. V. Handling Techniques. R. A. G. Welsher. *Nuclear Engineering*, v. 2, Nov. 1957, p. 469-473.

2831* A High Output D-D Neutron Generator for Biological Research. A. C. van Dorsten and J. H. Spaa. *Nuclear Instruments*, v. 1, Sept. 1957, p. 259-267.

Apparatus is capable of producing a fast neutron flux exceeding 10^{10} neutrons per sec. from a D-D reaction. The set consists of a pressurized cascade generator and an accelerator tube with a rotary heavy ice target. Selenium rectifiers are used.

2832* Coincidence Arrangement With High Time Resolution Used Together With a 100-Channel Pulse-Height Analyzer. B. Johansson. *Nuclear Instruments*, v. 1, Sept. 1957. p. 274-279.

Time-correcting circuit compensates for timespread due to different pulse heights. A resolving time of $2\tau_0$=9 mμs is obtained with NaI(Tl) crystals for γ energies above 50 k.e.v.

2833 Niobium-Uranium Alloys as Container Material for Molten Uranium Eutectic Alloys. G. W. Powell. *Nuclear Metals, Inc. (U. S. Atomic Energy Commission)*, NMI-1183, Aug. 1957, 20 p. (UF767 Un3.1nm Contin.)

Studies with U-5 wt.% Nb and U-10 wt.% Nb to determine the time and temperature limits within which the oxide layer re-

mains protective, the factors which hasten or delay the breakdown of the film, and the mechanism whereby the film deteriorates.

2834* Decay Scheme of Pb^{212}. E. M. Krisyouk, A. G. Sergeyev, G. D. Latyshev, and V. D. Vorobyov. *Nuclear Physics*, v. 4, Oct. 1957, p. 579-588.

2835* Parity Mixtures and Decay Processes. H. S. Green and C. A. Hurst. *Nuclear Physics*, v. 4, Oct. 1957, p. 589-598.

Examines the hypothesis that the μ-meson as well as the Λ- and Σ-hyperons are parity mixtures, and shows that the facts commonly attributed to parity nonconservation are explained in a unified way by this hypothesis, provided physical theory is invariant with respect to parity conjugation.

2836* Selection Rules for Beta and Gamma Particle Transitions in Strongly Deformed Nuclei. G. Alaga. *Nuclear Physics*, v. 4, Oct. 1957, p. 625-631.

2837* Power Station Instrumentation. J. C. Nutter and J. Dowsing. *Nuclear Power*, v. 2, Nov. 1957, p. 455-462.

Special requirements of nuclear power stations. Instrumentation and control systems.

2838 Liquid Scintillators in Filter Paper—A New Detector. Jean-Claude Roucayrol, Erich Oberhauser, and Richard Schussler. *Nucleonics*, v. 15, Nov. 1957, p. 104 + 2 pages.

Impregnating filter paper with a liquid scintillator increases sensitivity of detection.

2839 Investigation of the Factors Affecting Sensitization of Army Package Power Reactor (Appr-1) Fuel Elements. R. J. Beaver, R. C. Waugh, C. F. Leitten, Jr., and W. R. Burt, Jr. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2312, Oct. 1957, 20 p. (UF767 U3o Contin.)

2840 Experiments on the Kinetics of the HRE. V. K. Pare' and Sidney Visner. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2329, Oct. 1957, 34 p. (UF767 U3o Contin.)

Reactivity was added at rates up to 0.7% per sec. at initial power levels from one watt to 20 kw. and the transient power behavior was observed. Reactivity was increased by various means: control rods, reflector level, fuel concentration, and fuel temperature.

2841 Parameters of High Flux Testing Reactors. R. J. Howerton, G. H. Hanson, and W. P. Conner. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-16406, Aug. 1957, 51 p. (UF767 Un3.1id Contin.)

Derivation of the upper limit of mean thermal core flux. Nuclear calculations; effect on neutron flux of coolant, moderator, reflector, experimental facility radius, and fuel concentration.

2842 Standard Practices for Design of MTR and ETR Safety Circuits. L. H. Jones. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-16380, Sept. 1957, 34 p. (UF767 Un3.1id Contin.)

Power reduction types; reactor control requirements; system safety analysis; control flow sheet; wiring diagram.

2843 Delayed γ-Ray Angular Correlations in Tantalum-181. R. E. Azuma and G. M. Lewis. *Philosophical Magazine*, v. 2, ser. 8, no. 23, Nov. 1957, p. 1325-1332.

The anisotropy of the 133-480 k.e.v. γ-ray cascade in ^{181}Ta was investigated for liquid sources, using a time-sorting coincidence unit of short resolving time.

2844 Inelastic Scattering of Proton From Cu^{65}, Ni^{58}, Ni^{60}, and Ni^{62}. R. R. Spencer, G. C. Phillips, and T. E. Young. *Physical Review*, v. 108, ser. 2, Oct. 1, 1957, p. 69-71.

2845 Photoneutrons From Lead. M. Elaine Toms and William E. Stephens. *Physical Review*, v. 108, ser. 2, Oct. 1, 1957, p. 77-81.

The photoneutrons ejected from a small Pb target by 23 m.e.v. bremsstrahlung X-rays from a betatron were observed by means of recoil protons in nuclear emulsions. The angular distribution of the more energetic photoneutrons was nearly isotropic.

2846 Nuclear Decay of Br^{84} and the Level Scheme in Kr^{84}. Noah R. Johnson and G. D. O'Kelley. *Physical Review*, v. 108, ser. 2, Oct. 1, 1957, p. 82-90.

2847 Velocities of Fragment Pairs From U^{233}, U^{235}, and Pu^{239} Fission. William E. Stein. *Physical Review*, v. 108, ser. 2, Oct. 1, 1957, p. 94-98.

2848 Nuclear Energy Levels in Mn^{55}. M. Mazari, A. Sperduto, and W. W. Buechner. *Physical Review*, v. 108, ser. 2, Oct. 1, 1957, p. 103-105.

Inelastically scattered protons from manganese targets bombarded with protons from an electrostatic accelerator were studied with the high-resolution magnetic spectrograph. Forty-three excited states were established in the region between the ground state and 4.0 m.e.v. The first five of these levels are at 0.127, 0.983, 1.289, 1.527, and 1.884 m.e.v.

2849 Many-Body Problem in Quantum Field Theory. Abraham Klein and Charles Zemach. *Physical Review*, v. 108, ser. 2, Oct. 1, 1957, p. 126-138.

A formalism for the covariant description of scattering processes involving composite particles is derived from first principles. Its basic ingredients are the Green's functions of quantum field theory combined with a physically sound formulation of the adiabatic hypothesis. Explicit expressions are presented for various examples of nucleon-nucleus and boson-nucleus collisions.

2850 Electron Scattering Cross Sections Based on the Thomas-Fermi Theory. M. Majewski and T. Tietz. *Physical Review*, v. 108, ser. 2, Oct. 15, 1957, p. 193-196.

Considers all known approximations for the Thomas-Fermi function by means of which one may calculate in the first Born approximation the scattering amplitudes for a fast electron and the total cross section.

2851 Decay of Europium-154. José O. Juliano and F. S. Stephens, Jr. *Physical Review*, v. 108, ser. 2, Oct. 15, 1957, p. 341-348.

2852 Polarization Phenomena in the One-Quantum Annihilation of Positrons and the Photoelectric Effect. Kirk W. McVoy. *Physical Review*, v. 108, ser. 2, Oct. 15, 1957, p. 365-369.

Cross sections are derived for annihilation of longitudinally-polarized positrons and the photoelectric effect with longitudinal-polarized photons.

2853 Magnetic Analysis of the Long-Range Particles From Fission of U^{235}. Clyde B. Fulmer and Bernard L. Cohen. *Physical Review*, v. 108, ser. 2, Oct. 15, 1957, p. 370-372.

2854 Inelastic Scattering of 4-Mev Protons and Deuterons From Separated Isotopes of Dy^{161}, Dy^{163}, Yb^{171}, and Yb^{173}. B. Elbek, K. O. Nielsen, and M. C. Olesen. *Physical Review*, v. 108, ser. 2, Oct. 15, 1957, p. 406-410.

Inelastic groups corresponding to the two lowest rotational states were observed in Dy^{161} at 44 and 102 k.e.v., in Dy^{163} at 74 and 170 k.e.v., in Yb^{171} at 67 and 76 k.e.v., and in Yb^{173} at 78 and 181 k.e.v.

2855 Theory of Photoproduction of Pions From Nucleons. J. Enoch, R. G. Sachs, and K. C. Wali. *Physical Review*, v. 108, ser. 2, Oct. 15, 1957, p. 433-445.

A resonance theory of the pion-nucleon system based on a very general static model is extended to give an expression for the pion photoproduction amplitude.

2856 High-Energy Potential Scattering. Tai Tsun Wu. *Physical Review*, v. 108, ser. 2, Oct. 15, 1957, p. 466-469.

Asymptotically in the limit of high energies, successive approximations are obtained for the problem of potential scattering where the total phase shift through the potential is not small. Method consists of first applying the stationary-phase approximation to the integral equation and then solving the resulting equation by iteration to derive the asymptotic behavior of the field.

2857 The Low Energy Elastic Scattering of Neutrons by Deuterons. P. G. Burke and H. H. Robertson. *Physical Society, Proceedings*, v. 70, no. 455A, Nov. 1957, p. 777-792.

2858 Excitation Functions up to 980 MeV for Proton-Induced Reactions in Some Light Elements. J. L. Symonds, J. Warren, and J. D. Young. *Physical Society, Proceedings*, v. 70, no. 455A, Nov. 1957, p. 824-832.

A study of some of the active products from the high energy bombardment of C, N, O, and F.

2859* The Parity Conservation and the Strength of the Interaction of Elementary Particles. Sho Tanaka. *Progress of Theoretical Physics*, v. 18, Sept. 1957, p. 295-313.

An attempt to formulate a theory and approach the violation law of parity conservation and invariance under the particle conjugation in connection with strength of interactions.

2860 Radiation Shielding. B. T. Price, C. C. Horton, and K. T. Spinney. 350 p. 1957. Pergamon Press, New York. (QC795 P93r)

Biological hazards of nuclear radiations; attenuation of γ-rays and high energy electrons; shielding against neutrons; neutron physics; neutron attenuation in thick shields; useful mathematical formulas; the shielding of reactive and radioactive materials.

2861 Neutron Time-of-Flight Spectrometer for Use With the Harwell 110-Inch Cyclotron. J. P. Scanlon, G. H. Stafford, J. J. Thresher, and P. H. Bowen. *Review of Scientific Instruments*, v. 28, Oct. 1957, p. 749-757.

A 20-mμ sec. neutron pulse is obtained by electrostatic deflection of the internal proton beam of the cyclotron onto a thick Al target. By timing the neutrons over a 26-meter flight path an energy spread of 4.2% at 15 m.e.v. is obtained rising to 14% at 140 m.e.v.

2862 The Coherent Scattering of γ-Rays by *K* Electrons in Heavy Atoms. IV. The Scattering of $1{\cdot}28$ and $2{\cdot}56mc^2$ γ-Rays in Mercury. G. E. Brown and D. F. Mayers. *Royal Society, Proceedings*, v. 242, ser. A, Oct. 8, 1957, p. 89-95.

2863 The Scattering of Cold Neutrons by Liquid Helium. P. A. Egelstaff and H. London. *Royal Society, Proceedings*, v. 242, ser. A, Nov. 5, 1957, p. 374-391.

Data on the scattering of 45 *K* neutrons by saturated He vapour at $4{\cdot}2$ K. It is concluded that the moments of the radial distribution function are larger for the gas than for the liquid.

2864 Selected List of Neutron and Gamma Irradiation Facilities in Operation, Being Built, or Planned. John H. Martens, and F. G. Minuth, compilers. 79 p. 1957. Available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QC786 Un3.1s)

Technical data on 40 facilities. Services provided and how to obtain them.

2865 A Report on the Interaction of the Nuclear and Power Plant Controls for the SRE Steam Electric Generating Station. *Southern California Edison Company and North American Aviation, Inc. (U. S. Atomic Energy Commission)* AI-1612, Apr. 1956, 27 p. (UF767 Un3.1ai Contin.)

Details of the control system interconnecting the Sodium Reactor Experiment with the steam plant.

2866* (Norwegian.) Material Problems in Water-Cooled Energy Reactors. **Materialproblemer i vannkjølte kraftreaktorer.** Steinar Aas and Ketil Videm. *Teknisk Ukeblad*, v. 104, no. 41, Nov. 7, 1957, p. 907-916.

Problems of upkeep and control of a reactor. Behavior of metals at high temperatures; damage caused by corrosion and radiation in austenitic steel, Zr, Al, and U.

2867 Reactor Control Meeting Held in Los Angeles, March 6-8, 1957. *U. S. Atomic Energy Commission*, TID-7532, pt. 1, Oct. 1957, 241 p. (UF767 Un3ti Contin.)

Papers deal with experimental techniques and calculations used to determine control rod effectiveness.

2868 A Field Beta-Gamma Dose-Rate Meter. Frank A. Devlin. *U. S. Naval Radiological Defense Laboratory, Research and Development Technical Report* USNRDL-TR-178, May 1957, 14 p. (QC475 Un3.Sr Contin.)

Experimental results with a thin polyethylene chamber ionization detector of high sensitivity.

2869 The Livermore Pool Type Reactor (LPTR). John B. Radcliffe, Jr. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-4919, July 1957, 60 p. (UF767 U3u Contin.)

A survey of final design details of a tank-type thermal, heterogeneous research reactor facility, including a description of the reactor and related mechanical and electronic control systems, and a discussion of operating procedures and associated hazards.

2870 Fast Geiger-Mueller Counters. A Literature Review to May 1947. W. Wayne Meinke. *University of Michigan (U. S. Atomic Energy Commission)*, AECU-3484, May 1957, 35 p. (UF767 U3au Contin.)

2871* (Russian.) Light Particle Accelerators in Science and in National Economy. **Uskoriteli legkikh chastits v nauke i narodnom khoziaistve.** P. K. Oshchepkov. *Vestnik Akademii Nauk SSSR*, v. 27, no. 9, Sept. 1957, p. 25-30.

Several types of accelerators and their use in physics, medicine, biology, and industry.

2872 Technical Progress Report. Pressurized Water Reactor (PWR). *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-MRP-69, June-Aug. 1957, 78 p. (UF767 Un3.1wa Contin.)

Power plant analysis and systems; power plant components and component materials and tests; materials, control mechanisms, and tests; reactor and auxiliaries; core engineering; metallurgy of core materials; reactor physics.

2873 Reactor Criticality and Non-Negative Matrices. Garrett Birkhoff and Richard S. Varga. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-166, July 1957, 50 p. (UF767 Un3.1wa Contin.)

The Perron-Frobenius theory of non-negative matrices is applied to provide a rigorous mathematical basis for the physical concept of "criticality", and for typical computational interpretations of this concept.

2874* (German.) The Highly-Excited Conditions and β-Transfers of Certain Medium Light Nuclei. **Die hochangeregten Zustände und β-Übergänge einiger mittelleichter Kerne.** R. Srivastav. *Zeitschrift für Naturforschung*, v. 12a, Sept. 1957, p. 679-693.

Oscillator wave-functions were used to represent the motion of nuclei in a Hartree-field. The negative parities of highly excited spectra of O_{14}, N_{14}, and F_{18}, were determined by the energy variation method.

2875* (German.) Transition Effects With Fast Electron Rays. **Übergangseffekte bei schnellen Elektronenstrahlen.** G. Breitling. *Zeitschrift für Physik*, v. 149, no. 2, 1957, p. 180-198.

Loss of energy by radiation and inelastic collisions. Atom excitation; production of secondary electrons. Angular distribution of the secondary electrons. Energy division into excitation and ionization.

See also: **1689** (ThO_2-UO_2 fuel elements); **1719** (radioisotope laboratory); **1788** (B-10 burnup determination); **1799** (isotopic analysis of uranium); **2119** (design of accelerators); **2133** (instruments for nuclear reactors); **2184** (nuclear shielding for electronic parts); **2252** (economics of nuclear power); **2253** (atomic power plant economics); **2328** (cosmic-ray monitor); **2460** (stability of uranium alloys); **2461** (fuel plate fabrication); **2462** (radioisotope in metallurgy); **2464** (alloys for pressurized water in-pile tubes); **2482** (EBWR metallurgy); **2486** (U and UO_2); **2487** (B-Al and B-U-Al alloy for reactors); **2497** (corrosion of Al-Ni alloy in test loop); **2554** (recovery of Th^{230} from U wastes); **2561** (processing of spent U fuel); **2562** (enrichment of U^{235}); **2633** (wetting of solids by liquid metals); **2883** (manpower requirements for atomic industry); **2904** (thermal stresses in semi-plastic cylinder); **2921** (elementary atomic physics); **3005** (scavenging devices for determining fallout); **3013** (radioactive waste disposal).

OPERATIONS RESEARCH AND MANAGEMENT ENGINEERING

2876* Leadership Style as a Variable in Research Administration. Howard Baumgartel. *Administrative Science Quarterly*, v. 2, Dec. 1957, p. 344-360.

Laboratory directors in a large government research organization were identified as employing three different leadership styles—participatory, laissez-faire, and directive. Participatory leadership was found to be associated with the highest scores on a number of different measures of the motivations and attitudes of the scientists.

2877 Human Engineering and Direct Operating Labor Costs in Chemical Plants. Bruce L. Cusack. *Chemical Engineering Progress*, v. 53, Oct. 1957, p. 471-475.

An analysis of the value of human engineering principles applied in the chemical industry.

2878 Organization and Functions of an Operations Analysis Group. Helmut W. Schulz. *Chemical Engineering Progress*, v. 53, Nov. 1957, p. 548-550.

A case study of how one operations analysis group is organized, how it fits into the corporate structure, what sort of functions it performs, and how these services are utilized.

2879 The Executives Handbook and Business Equipment Buyers' Guide. 480 p. 1956. Dartnell Publications, Inc., Chicago. (HF5500 D25e)

Business organization; financial controls and reports; corporate investments; purchasing policies; personnel management; employee development programs; cutting production costs; pay plans; sales management; market expansion; expense control; credit management.

2880 Instrumentation of Human Endurance. Sidney R. Smith. *Institute of Radio Engineers, Transactions on Instrumentation*, v. I-6, Sept. 1957, p. 163-171. (TK1 In6.6i Vis.)

Conclusions from the planning of an experiment which may isolate and measure the effects of extreme confinement upon an aircraft crew of five men. Feasibility of monitoring and recording conduct, performance, and autonomic-response variables in sufficient number and with sufficient accuracy to provide useful new data.

2881* Management Models and Industrial Applications of Linear Programming. A. Charnes and W. W. Cooper. *Management Science*, v. 4, Oct. 1957, p. 38-91.

2882 Proceedings of the Conference on Operations Research, Computers, and Management Decisions. Jan.-Feb. 1957. 97 p. 1957. Case Institute of Technology, Cleveland. (HD20 C21.2p Over.)

Papers deal with use of computers in solving operations research problems, how operations research enters into computer facility design, how data processing control systems are introduced into a business, and how computers can be used to solve complex management problems.

2883 Scientific and Engineering Manpower Requirements for the Atomic Industry. 35 p. 1957. Atomic Industrial Forum, Inc., New York. (TA157 At71s Over.)

2884 An Application of Some Industrial Engineering Principles to an Electrical Maintenance Organization. George W. Oliphant. *Union Carbide Nuclear Company (U. S. Atomic Energy Commission)*, Y-1172, Sept. 1957, 138 p. (UF767 Un3.1y Contin.)

Management of electrical maintenance; electrical shop layout; work simplification; work measurement; engineering economy; safety.

See also: **2388** (management-employee communication.)

ORE AND MATERIALS BENEFICIATION

2885 Pilot-Plant Studies on Nonaqueous Leaching of Western Ores. D. D. Foley, W. A. Meeley, and R. B. Filter, Jr. Paper from "Advances in Nuclear Engineering". v. I. Pergamon Press. 1957. p. 33-40. (TK9006 N88 Over.)

A pilot plant was constructed and operated successfully to demonstrate an HCl-acetone process for extracting U. The process is described by material and equipment flowsheets. A recovery of 90 to 95% was obtained during short periods of operations. Solvent losses and upgrading of product are discussed.

2886 The Isolation and Separation of Niobium and Tantalum Pentoxides From Mineral Concentrates by Liquid-Liquid Extraction. G. H. Faye and W. R. Inman. *Canadian Mining and Metallurgical Bulletin*, v. 50, Oct. 1957, p. 609-613; *Canadian Institute of Mining and Metallurgy, Transactions*, v. 60, 1957, p. 343-347.

Novel feature of proposed method is the use of an HF-HNO_3 mixture in all essential steps.

2887 Gamma Density Controls Extraction Column. Bernard G. Ryle. *Chemical Engineering Progress*, v. 53, Nov. 1957, p. 551-555.

Gamma absorption density gaging can monitor both the organic extract and the aqueous raffinate and can control column feed rates to maintain normal steady-state operation in a liquid-liquid uranium extraction process.

2888* (Russian.) The Mechanism of Action of Reagents in the Flotation Process. **K mekhanizmu deistviia reagentov pri flotatsii.** V. I. Klassen and L. P. Starchik. *Doklady Akademii Nauk SSSR*, v. 115, no. 6, Aug. 21, 1957, p. 1129-1130.

Experimentally proves the higher concentration of collecting reagent molecules in the three-phase contact zone.

2889 Iron Ore Beneficiation. Lawrence A. Roe. 305 p. 1957. Minerals Publishing Co., Lake Bluff, Ill. (TN520 R62i)

History; sources and economics; iron ore minerals; washing and jigging; heavy-media separation processes; tabling and spiral treatment; flotation; magnetic separation; pyrometallurgical processing; hydrometallurgy and by-products; agglomeration.

2890 Dissolution of Pyrite Ores in Acid Chlorine Solutions. M. I. Sherman and J. D. H. Strickland. *Journal of Metals*, v. 9, sec. 1; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Oct. 1957, p. 1386-1388.

Apparatus and technique for reacting a known area of sulfide ore with a known volume of chlorine water and measuring the rate of dissolution of the ore. Pyrite, under all conditions studied, produces only ferric ions and sulfate ions, and the reaction is diffusion controlled with an energy of activation of about 5000 cal. per mole.

2891* (Russian.) Possibility of Separation of Resinous Cutinic Components From Coal by Flotation. **O vozmozhnosti vydeleniia smolianykh i kutinizirovannykh komponentov iz uglei metodom flotatsii.** A. N. Chistiakov, E. S. Korzhenevskaia, and V. A. Proskuriakov. *Khimiia i Tekhnologiia Topliva, i Masel*, 1957, no. 10, Oct., p. 6-9.

Concentrating microcomponents of coal by flotation, using pine oil and kerosene for frothing. Flotation conditions were determined.

2892* (Russian.) Enriching of Coals for the Coal-Tar Chemical Industry. **Obogashchenie uglei na koksokhimicheskikh zavodakh.** V. Ia. Toporkov. *Koks i Khimiia*, 1957, no. 11, p. 18-23.

Description of flotation methods and equipment.

2893* New Pellet Hardening Method Uses Grate and Kiln Firing. W. F. Stowasser, Jr. *Mining World*, v. 19, Nov. 1957, p. 59-60.

Essentially, the process consists of four steps: forming the pellets in a balling pan or drum, drying on a moving grate, heating (partially oxidizing) the pellets on a moving grate, and final burning in a short rotary kiln.

2894 Analytical Program for Processing Aluminum-Uranium Reactor Fuel Elements. Ralph C. Shank and James E. Rein. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-14412, Aug. 1957, 21 p. (UF767 Un3.1id Contin.)

Methods are described for U, acidity, β and γ activity, and specific gravity in the dissolver solution; for small amounts of U in the extraction column raffinates; and for U in the final product.

2895 Analytical Program for Processing Zirconium-Uranium Reactor Fuel Elements. James E. Rein and Ralph C. Shank. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-14413, Aug. 1957, 28 p. (UF767 Un3.1id Contin.)

Methods are described for U, acidity, Zr, Al, fluoride, and specific gravity in the dissolver and column feed solutions; for small amounts of U in the extraction column raffinates; and for tributylphosphate in the extractant.

2896 (German.) Production of Burden Briquettes Without Binders From Ore, Brown Coal, and Basic Fluxes. **Bindemittellose Erzeugung von Möllerbriketts aus Erz, Braunkohle und basischem Zuschlagstoff.** Wilhelm Petersen and Siegfried Wawroschek. *Stahl und Eisen*, v. 77, no. 21, Oct. 17, 1957, p. 1427-1435.

Low temperature smelting, its importance, and the raw material used. Briquetting capability; stability in the furnace of briquettes made of brown coal and hydrate of lime.

2897* (German.) Methods for Concentrating Titanium Ore. **Verfahren der Titanerzaufbereitung.** Willy K. Finn. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 10, Oct. 1957, p. 471-479.

Comparisons of various methods including wet-dry mechanical gravity, magnetic, flotation, electrostatic, and other processes.

2898* (German.) Relationship Between Adhesive Loss of Charge Material, and Surface Finish (Roughness) and Shape and Size of Grain of the Charge in the Sink-Float Process. **Abhängigkeit der Haftverluste an Beschwerstoff beim Sink-Schwimm - Verfahren von der Oberflächenbeschaffenheit (Rauhigkeit), Kornform und Korngrösse der Aufgabe.** Gerhard Gerth. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 10, Oct. 1957, p. 493-499.

The adhesive loss is larger with laminated grain, smaller with columnar grain. It increases with decrease of grain-size index, and with increase of the surface roughness.

See also: **2255** (transport and handling of German iron ore).

PHYSICS

2899 Ultrasonic Velocity and Thermal Relaxation in Dry CO_2 at Moderate Pressures. M. C. Henderson and L. Peselnick. *Acoustical Society of America, Journal*, v. 29, Oct. 1957, p. 1074-1080.

2900 (English.) **The Equilibrium Form of Crystalline Bodies.** R. L. Fullman. *Acta Metallurgica*, v. 5, no. 11, Nov. 1957, p. 638-648.

Crystalline materials with anisotropic surface free-energy may have lower total free-energy in particular polycrystalline configurations than in any single-crystal shape. Calculations are presented of the relative free-energies of two-dimensional and three-dimensional single crystals and polycrystals with radial or tangential intercrystalline boundaries.

2901* (English.) **Electron Correlation in Molecules. I. The Ethylene Molecule. II. The Benzene Molecule.** Włodzimierz Kołos. *Acta Physica Polonica*, v. 16, no. 4, 1957, p. 257-278.

Calculations of energy levels by an extended molecular orbital method.

2902 Theory of the Relativistic Oscillator. L. A. MacColl. *American Journal of Physics*, v. 25, Nov. 1957, p. 535-538.

A study of the motions of a particle subject to the restoring force exerted by a linear spring, under the assumption that the mass depends upon the speed according to the formula given by the theory of special relativity.

2903 Basic Concepts of Ultrasonic Interferometry in Liquids. E. F. Carome, F. A. Gutowski, and D. E. Schuele. *American Journal of Physics*, v. 25, Nov. 1957, p. 556-564.

2904 Thermal Stress Analysis of a Cylinder of Semi-Plastic Material. Donald Hunter and Glenn Murphy. *Ames Laboratory (U. S. Atomic Energy Commission)*, ISC-839, Dec. 1956, 31 p. (UF767 Ur3.1is Contin.)

Derivation of a solution for the thermal stresses in a finite cylindrical solid composed of a material for which the modulus of elasticity decreases linearly with an increase in temperature. Evaluation of stresses in a cylindrical U fuel slug in which heat is produced by fission.

2905* (French.) Investigations of the Stark Effect of the Mercury Atom by the Magnetic Resonance Method. **Recherches sur l'effet stark de l'atome de mercure par la méthode de résonance magnétique.** J.-E. Blamont. *Annales de Physique*, v. 2, ser. 13, nos. 7-8, July-Aug. 1957, p. 551-610.

The stark effect at the 6^3P_1 level of the even isotopes of Hg. Measurement at 2.5% precision from 10 to 70 kv. per cm. Apparent life of the level as a function of the partial pressure of the isotopes. Actual life at the P^3P_1 level.

2906 (French.) Faraday Effect and Double Refraction in Ferrites Subjected to High Frequency Waves. **Effet Faraday et biréfringence dans les ferrites en hyperfréquence.** Ferdy Mayer. *Annales des Telecommunications*, v. 12, nos. 7-8, July-Aug. 1957, p. 279-288.

(To be continued.)

2907 Estimation of Temperature Pattenrs in Multiply-Shielded Systems. J. G. Bartas and E. Mayer. *ASME, Transactions*, v. 79, Nov. 1957, p. 1722-1726.

The method of difference equations is employed to examine the effect of shield curvature, end radiation, and gas radiation on the temperature recorded by a shielded thermocouple in a variety of heating conditions.

2908* (German.) Thermal Conductivity of Gaseous Mixtures. **Wärmeleitfähigkeit von Gasgemischen.** Heinz Lehmann. *Chemische Technik*, v. 9, no. 9, Sept. 1957, p. 530-537.

An investigation of the heat conductivity of gas mixtures and of the real factors and values to be considered in their calculation. Usability of available empirical formulas; methods of determination for non-polar and polar gas mixtures.

2909* (French.) A New Study of the L Spectra of Nickel and Copper. **Nouvelle étude des spectres L du nickel et du cuivre.** Yvette Cauchois and Christiane Bonnelle. *Comptes Rendus*, v. 245, Oct. 7, 1957, p. 1230-1234.

Determining variation of the intensity of emission bands with energy and of the value of absorption coefficients near discontinuities.

2910* (French.) Abnormal Dispersion of Single Crystals of Red Mercuric Iodide. **Dispersion anormale de monocristaux d'iodure mercurique rouge.** Manuel Sieskind. *Comptes Rendus*, v. 245, Oct. 21, 1957, p. 1410-1412.

Thin single crystals of red mercuric iodide, studied under reflected light, offer a spectrum made of thin lines converging towards the edge of continuous absorption. This spectrum was used to study abnormal dispersion.

2911* (Russian.) The Types of Vibration of Plasma in a Magnetic Field. **O tipakh kolebanii plazmy v magnitnom pole.** S. I. Braginskii. *Doklady Akademii Nauk SSSR*, v. 115, no. 3, July 21, 1957, p. 475-478.

Discusses the basic hydrodynamical equation of wave propagation applied to this case. Waves of high and low frequency equations are given.

2912* (Russian.) X-Ray Investigation of the Effect of One-Sided Pressure on the Structure of Barium Titanate Polycrystals. **Rentgenograficheskoe issledovanie vliianiia odnostoronnego davleniia na strukturu polikristallicheskogo titanata bariia.** I. G. Ismailzade. *Doklady Akademii Nauk SSSR*, v. 115, no. 3, July 21, 1957, p. 479-482.

Investigation of ferro-electric ceramics under pressure. Gives diffraction maximums, Curie point, and tetragonality of the lattice.

2913* (Russian.) Calculation of the Magnetization of Uniaxial Ferrite at Low Temperatures. **Rashet namagnichennosti odnoosnogo ferrita pri nizkikh temperaturakh.** E. N. Iakovlev. *Doklady Akademii Nauk SSSR*, v. 115, no. 4, Aug. 1, 1957, p. 699-701.

Mathematical analysis.

2914* (Russian.) Study of KBr Crystals for Variation of Conductivity in a Strong Field at 300-450 C. **Izmenenie provodimosti KBr v sil'nykh poliakh v oblasti temperatur**

300-450°C. V. F. Pisarenko. *Doklady Akademii Nauk SSSR*, v. 115, no. 5, Aug. 11, 1957, p. 898-900.

Investigation of conductivity increase in KBr single crystals without change of color. A resistance of 10^5 ohm was introduced to prevent breakdown.

2915* (Russian.) Specific Heat of Solids as Dependent on Temperature. **O temperaturnoi zavisimosti teploemkosti tverdykh tel.** N. N. Sirota. *Doklady Akademii Nauk SSSR*, v. 115, no. 5, Aug. 11, 1957, p. 901-903.

Formula for calculation of the relation between temperature and specific heat is given, based on the Einstein equation for inner energy.

2916* (Russian.) Luminescence Polarization Diagrams of Stilbene Single Crystals. **Poliarizatsionnye diagrammy liuminestsentsii monokristallov stil'bena.** V. N. Varfolomeeva and N. D. Zhevandrov. *Doklady Akademii Nauk SSSR*, v. 115, no. 6, Aug. 21, 1957, p. 1115-1118.

Calculation of crystal relations and polarization diagrams, based on X-ray data.

2917 Ultrasonics—The New Electronic Art. I. John E. Hickey, Jr. *Electronic Industries & Tele-Tech*, v. 16, Nov. 1957, p. 58 + 6 pages.

How ultrasonic energy is applied; selection of transducers and generators; application in metal joining and in the medical field.

2918 The Effect of a Variable Evaporation Rate on the Ballistics of Droplets. C. C. Miesse. *Franklin Institute, Journal*, v. 264, Nov. 1957, p. 391-401.

2919 Heat Conduction, With Engineering, Geological, and Other Applications. Leonard R. Ingersoll, Otto J. Zobel, and Alfred C. Iingersoll. Rev. Ed. 325 p. 1954. University of Wisconsin Press, Madison. (QC321 In4h2)

Theoretical analysis of types of flow. Formation of ice. Methods of measuring thermal-conductivity constants. Theory of earth heat exchangers for the heat pump. Drying and soil consolidation.

2920* The Theory of the Anharmonic Oscillator. K. S. Viswanathan. *Indian Academy of Sciences, Proceedings*, v. 46, sec. A, Sept. 1957, p. 203-217.

Exact expressions were obtained for the frequency of an anharmonic vibration, the shift in its equilibrium position from the origin, and the amplitudes of its different harmonics. The frequency is a decreasing function of the energy.

2921 (German.) Introduction to Physics. **Einführung in die Physik. v. III.** Optics and Atomic Physics. **Optik und Atomphysik.** Walter Schallreuter. 574 p. 1956. Wilhelm Knapp Verlag, Halle, East Germany. (QC23 Sch15e)

College text covers light reflection and refraction, interference phenomena, optical instruments, and elementary atomic theory.

2922 Ionization in the Trial of High-Velocity Pellets. William S. Partridge and L. Dale Harris. *Journal of Applied Physics*, v. 28, Nov. 1957, p. 1269-1271.

Aluminum, Mg, and Li-Mg pellets were accelerated to velocities as high as 4.5 km. per sec. by means of an explosive. The ionization in the trails of these pellets was determined by measuring the reflection of a microwave signal from the trail.

2923 Motion of an Arc in a Magnetic Field. Charles G. Smith. *Journal of Applied Physics*, v. 28, Nov. 1957, p. 1328-1331.

A magnetic field transverse to an arc tends to move the cathode spot in either the direction of the electro-magnetic force (the amperian sense) or in the opposite direction (the retrograde sense). Possible explanation for the retrograde motion are considered.

2924* Wave Propagation in a Heterogeneous Elastic Medium. A. Robinson. *Journal of Mathematics and Physics*, v. 36, Oct. 1957, p. 210-222.

2925* (French.) Research on the Levels of He by Optical Spectroscopy at Low Temperature. **Étude de la structure des niveaux de l'hélium par spectroscopie optique a très basse température.** J. Brochard, R. Chabbal, H. Chantrel, and P. Jacquinot. *Journal de Physique et le Radium*, v. 18, no. 10, Oct. 1957, p. 596-602.

2926* Term Analysis of the First Spectrum of Rhenium (Re I). P. F. A. Klinkenberg, W. F. Meggers, R. Velasco, and M. A. Catalan. *Journal of Research, National Bureau of Standards*, v. 59, Nov. 1957, p. 319-348.

With the aid of new data on wavelengths, intensities, and the the Zeeman effect, the structural analysis of the first spectrum of rhenium (Re I) was extended to include 2,764 lines that are explained as transitions among 282 atomic energy levels.

2927* A Device for the Precision Measurement of an Inhomogenous Magnetic Field. Gunnar Bäckström. *Nuclear Instruments*, v. 1, Sept. 1957, p. 253-258.

A generator device was constructed for measuring the field of a β-spectrometer, having a gradient of 1% per cm. and a field range 10 to 300 gauss. A sensitivity of 1.10^5 was obtained.

2928 On the Relationship Between the Charge of an Ion and Its Velocity. Jacob Neufeld. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2365, Oct. 1957, 86 p. (UF767 U3o Contin.)

Presents a set of graphs showing "Lisitzin" and "Mayer" curves and data of Finkelnburg. Graphs represent the relationship between the outermost orbital velocity of an ion and the corresponding binding charge for all elements except Li, N, O, F, Ne, Sr, and Xe.

2929 Simple Submicrosecond Light Source With Extreme Brightness. Heinz Fischer. *Optical Society of America, Journal*, v. 47, Nov. 1957, p. 981-984.

Maximum brightness of approximately 40 million candles/cm^2 with 0.25μ sec. half-width or shorter is obtained in a capacitor-discharge with open air gap in which a toroidal capacitor surrounds the gap coaxially.

2930 Reflection of X-Rays From Condensed Metal Films. L. M. Rieser, Jr. *Optical Society of America, Journal*, v. 47, Nov. 1957, p. 987-994.

Measurements on Be, Al, Ti, Cr, Ni, Cu, Ag, Ir, Pt, and Au.

2931 Some Problems in Low-Temperature Pyrometry. T. P. Gill. *Optical Society of America, Journal*, v. 47, Nov. 1957, p. 1000-1005.

Refers to the measurement of small temperature differences, especially the influence of changes in emissivity and the general spectral distribution of the energy exchange between two bodies at nearly the same temperature are discussed.

2932 The Remanent Magnetization of Single Domain Ferromagnetic Particles. E. P. Wohlfarth and D. G. Tonge. *Philosophical Magazine*, v. 2, ser. 8, no. 23, Nov. 1957, p. 1333-1344.

Calculation for particles with a number of equivalent easy directions of magnetization, and also for particles with mixed uniaxial anisotropies. Applications to other materials.

2933 Lattice Energies of Ionic Cubic Crystals. C. E. Weir. *Physical Review*, v. 108, ser. 2, Oct. 1, 1957, p. 19-21.

By means of a proposed hypothetical cycle the lattice energies of binary alkaline earth-group VI ionic crystals are calculated from those of the alkali halides with reasonably good agreement.

2934 Magnetic Annealing Effect in Cobalt-Substituted Magnetite Single Crystals. R. F. Penoyer and L. R. Bickford, Jr. *Physical Review*, v. 108, ser. 2, Oct. 15, 1957, p. 271-277.

2935* (English.) **Determination of Dislocation Densities Through Nuclear Resonance Studies.** Eizo Otsuka and Hazimu Kawamura. *Physical Society of Japan, Journal*, v. 12, no. 10, Oct. 1957, p. 1071-1082.

Previous studies of quadrupolar effects of mixed alkali halide on nuclear resonance were extended to Br in KBr-NaBr. Using the correction factor of about 40 derived for Br in KBr, it was possible to determine the dislocation density for plastically deformed crystals and thus estimate the density for an undeformed crystal.

2936 Flash-Absorption Spectra of the Plasmas of Arcs and Other Discharges. W. R. S. Garton and A. Rajaratnam. *Physical Society, Proceedings*, v. 70, no. 455A, Nov. 1957, p. 815-823 + 2 plates.

Photometric determination of the total absorption under a number of lines, combined with relative emission intensities,

yield values of line-reversal temperatures; some first results are reported for Cu arcs.

2937 The Influence of an Axial Magnetic Field on the Stability of a Constricted Gas Discharge. R. J. Tayler. *Physical Society, Proceedings*, v. 70, no. 455B, Nov. 1957, p. 1049-1063.

2938 Low Temperature Heat Capacity and Thermodynamic Properties of Zinc Ferrite. Edgar F. Westrum, Jr. and D. M. Grimes. *Physics and Chemistry of Solids*, v. 3, nos. 1-2, 1957, p. 44-49.

2939 Free Energy, Internal Fields and Ionic Polarizibilities in $BaTiO_3$. S. Triebwasser. *Physics and Chemistry of Solids*, v. 3, nos. 1-2, 1957, p. 53-62.

The electronic and ionic polarizations and the ionic polarizibilities are calculated allowing for the atomic displacements found from neutron diffraction data. The internal Lorentz fields are found at the displaced atomic sites. Slater's method for deriving the free energy from an ionic potential function is extended to include terms of the sixth power in the displacement of the ions.

2940 Reversible Properties of Polycrystalline Ferromagnets. I. Theory of the Expected Variation of the Reversible Properties With Magnetization. D. M. Grimes. *Physics and Chemistry of Solids*, v. 3, nos. 1-2, 1957, p. 141-152.

2941 Reports on Progress in Physics. A. C. Stickland, editor. v. XX. 568 p. 1957. Physical Society, London. (QC3 P56r Vis.)

Theories of plasma oscillations in metals, liquid He^4, and collective behavior. High-energy protons. K-mesons and hyperons. Microwave properties of solids. High-speed photography. Photographic sensitivity. Theory and properties of solid argon.

2942 Hermetic Seal for Ferrites. Arthur H. Iversen. *Review of Scientific Instruments*, v. 28, Oct. 1957, p. 797-799.

Absorption of moisture is prevented by coating the surface of the ferrite with a thin layer of glass. This seal has good mechanical and thermal shock properties and yet has negligible effect on the electrical properties.

2943 Non-Linear Effects in Electron Plasmas. P. A. Sturrock. *Royal Society, Proceedings*, v. 242, ser. A, Nov. 5, 1957, p. 277-299.

Effects fall into three groups: the excitation of harmonics; coherent interaction; and incoherent interaction.

2944 Interferometry of the Intensity Fluctuations in Light. I. Basic Theory: the Correlation Between Photons in Coherent Beams of Radiation. R. Hanbury Brown and R. Q. Twiss. *Royal Society, Proceedings*, v. 242, ser. A, Nov. 5, 1957, p. 300-324.

Quantitative predictions of the theory were confirmed by laboratory experiments and the phenomenon was used, in an interferometer, to measure the apparent angular diameter of Sirius.

2945* (English.) **Thermal and Magnetic Properties of Iron Sulfides With Nickel-Arsenide Structure.** Seijirô Maeda. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 9, no. 5, Oct. 1957, p. 347-373.

2946 A Method of Computing the Transient Temperature of Thick Walls From Arbitrary Variation of Adiabatic-Wall Temperature and Heat-Transfer Coefficient. P. R. Hill. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4105, Oct. 1957, 54 p. (TL570 Un3t)

2947* (German.) Photometry in the Extreme Ultra-Violet With Fluorescence-Sensitized Photographic Material. **Zur Photometrie im extremen Ultraviolett mit fluoreszenz-sensibilisiertem Photomaterial.** H. Greiner. *Zeitschrift für Naturforschung*, v. 12a, Sept. 1957, p. 735-738 + 2 plates.

Agfa-roentgen film, sensitized with sodium-salicylate, is said to be the proper photographic material for use in the extreme UV. Its sensitivity and resolving power are compared with those of the Kodak-SWR film.

2948* (German.) The Ratio of Intensity of Raman and Rayleigh Rays in Carbon Tetrachloride. **Das Intensitätsverhältnis von Raman- und Rayleigh-Linien beim Tetrachlorkohlenstoff.** Josef Brandmüller and Heinz Schrötter. *Zeitschrift für Physik*, v. 149, no. 2, 1957, p. 131-152.

2949* (German.) The Absorption Spectrum of Electrons of the Interference Patterns of Ion Lattices. **Zum Absorptionsspektrum von störstellenelektronen in Ionengittern.** H. D. Koswig and O. Stasiw. *Zeitschrift für Physik*, v. 149, no. 2, 1957, p. 210-214.

2950* (German.) Photoelectric Conduction in KCl Crystals. **Lichtelektrische Leitung in KCl-Kristallen.** Nikolaus Barth. *Zeitschrift für Physik*, v. 149, no. 3, 1957, p. 370-376.

In cumulatively decolorized KCl crystals, Farnsworth centers were formed by irradiation at room temperature. The centers appear in the form of absorption bands. Photoelectric conduction in the C-band as a function of temperature and wave length.

2951* (German.) Relationship Between Temperature and Intensity Luminescence of Various Activated CdS-Crystals. **Die Temperaturabhängigkeit der Lumineszenzintensität verschieden aktivierter CdS-Kristalle.** W. Ludwig and R. Seiwert. *Zeitschrift für Physikalische Chemie (Leipzig)*, v. 207, nos. 3-4, Aug. 1957, p. 250-272.

Studied by excitation with light of 365 mμ. wavelength in the temperature range from −180 to + 120 C.

2952* (Russian.) The Spectrum of Edge Absorption of CdS-Crystals and Its Connection With Surface and Deformations of Crystals. **Spektr kraevogo pogloshcheniia kristallov sul'fida kadmiia i ego sviaz' s poverkhnost'iu i deformatsiiami kristallov.** E. F. Gross and B. S. Razbirin. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 9, Sept. 1957, p. 2173-2176 + 1 plate.

The spectra of CdS crystals of different thickness were studied.

See also: **1699** (magnetic properties of Ti ferrites); **2692** (thermal diffusivity of metals).

PLASTICS

2953* (English.) **A New Approach to the Determination of Distribution Functions, Especially for Polymers.** Karl Erik Almin and Börje Steenberg. *Acta Chemica Scandinavica*, v. 11, no. 6, 1957, p. 936-939.

Inherent weakness in current methods for the determination of molecular weight distribution functions. A new method based on liquid-liquid distribution at equilibrium conditions.

2954 Electron Exchange Polymers. X. A General Method for the Preparation of Phenolic Polystyrenes. Robert Stern, James English, Jr., and Harold G. Cassidy. *American Chemical Society, Journal*, v. 79, Nov. 5, 1957, p. 5792-5797.

Vinylhydroquinone bis-methoxymethyl ether was obtained in 60% yield from hydroquinone in a three-step synthesis; catechol gave similarly 3-vinylcatechol bis-methoxymethyl ether, and *p,p'*-biphenol afforded *p,p'*-biphenol bis-methoxymethyl ether. All three monomers could be polymerized. Mild hydrolysis of the acetal groups afforded analytically pure polyvinylhydroquinone, 3-polyvinylcatechol, and 3-polyvinyl-*p,p'*-biphenol.

2955 Creep of Glass-Reinforced Plastics. S. Goldfein. *ASTM Bulletin*, 1957, no. 225, Oct., p. TP179-TP186.

An interim report on development of a method of determining the creep properties of glass-reinforced plastic laminates by short-time or static tests of their properties at temperatures up to 500 F.

2956 A Study of the Low-Temperature Brittleness Testing of Polyethylene. E. A. W. Hoff and S. Turner. *ASTM Bulletin*, 1957, no. 225, Oct., p. TP208-TP214.

The brittleness temperature of polyethylene depends upon the melt flow index, method of specimen preparation, and annealing cycle to which the specimens are subjected prior to testing.

2957 Melamine Extends Its Range. *British Plastics*, v. 30, Oct. 1957, p. 424-429.

Use in decorative laminates, molding materials, and in resin formulations for metals, paper, and textiles.

2958 High Speed Screw Extruders. Erich Beck. *British Plastics*, v. 30, Oct. 1957, p. 441-445.

Theoretical principles; construction advantages; efficiency; extending the range of use.

2959 A Survey of Some Curing Methods of Polyester Resins. J. W. Cywinski. *British Plastics*, v. 30, Oct. 1957, p. 449-454.

Mechanism of catalyzation; decomposition of organic peroxides; accelerators; room temperature curing; peak point; medium and high temperature curing; choice of catalyst.

2960 "Étalu" Plastics Filled With Aluminum. X. Béchu. *Henry Brutcher Translation No.* 3984, 10 p. (From *Revue de l' Aluminium*, v. 33, 1956, p. 1165-1170.) Henry Brutcher, Altadena, Calif.

Composition, mechanical and other properties, manufacture, further processing, and applications of various plastics such as polystyrene, bakelite, and polyester, with Al ranging in particle size from 16 to 200 mesh serving as a filler.

2961* (Russian.) Determination of Degree of Polymerization of Cellulose in Industrial Control. **Opredelenie stepeni polimerizatsii tselliulozy pri proizvodstvennom kontrole.** E. N. Liubimova, Z. D. Kuz'mina, K. P. Iziumskaia, and F. P. Komarov. *Bumazhnaia Promyshlennost'*, v. 32, no. 10, Oct. 1957, p. 7-10.

Feasible and simplified industrial control method for determination of degree of polymerization of cellulose with a specially designed viscosimeter.

2962 The Effect of Hydrogen Chloride on the Infrared Spectrum of Nylon. P. Larose. *Canadian Journal of Chemistry*, v. 35, Nov. 1957, p. 1239-1247.

Definite changes in the characteristic bands of the NH-CO group show that HCl interacts with this group. The results indicate that the two NH bands at 3300 $cm.^{-1}$ and 3030 $cm.^{-1}$ are associated with different NH bonds.

2963 Photo-Initiated Free Radical Polymerization of Methyl Acrylate in Aqueous Solution. C. Chaitanyan Menon and M. Santappa. *Canadian Journal of Chemistry*, v. 35, Nov. 1957, p. 1267-1277.

Using mainly light of wavelength 3650 A and the ion pairs $Fe^{3+}OH^-$ and $Fe^{3+}Cl^-$ as photosensitizers, the kinetics of polymerization were investigated. Initiation of polymerization is due to OH or Cl free radicals formed by the dissociation of the primary product; termination occurs by combination of growing polymer chains.

2964* (English.) **Crystallinity Studies of Polychlorotrifluoroethylene by Infrared Method. I. Measurement of the Degree of Crystallinity.** Hiroshi Matsuo. *Chemical Society of Japan, Bulletin*, v. 30, no. 6, Sept. 1957, p. 593-597.

2965* (German.) Attempts to Use Polytrifluorochloroethylene as Material for Containers in Analytical Work. **Versuche über den Einsatz von Polytrifluorchloräthylen als Gefässwerkstoff im analytischen Laboratorium.** H. Pohl. *Chemiker-Zeitung*, v. 81, no. 20, Oct. 20, 1957, p. 681-683.

Vessels made of Hostaflon by the injection-molding process, were analyzed as to their chemical and thermal resistance.

2966* Urethane Foams. A Review of Their Chemistry and Technology. William C. Parle. *Chemistry in Canada*, v. 9, Oct. 1957, p. 35-39.

2967* (Italian.) Copolymerization of Ethene With Aliphatic α-Olefins. **Copolimerizzazione dell'etilene con le α-olefine alifatiche. III.** Ethene-Propene Copolymerization With Vanadium Tetrachloride Derived Catalysts. **Copolimerizzazione etilene-propilene con catalizzatori ottenuti da tetracloruro di vanadio.** G. Mazzanti, A. Valvassori, and G. Pajaro. *Chimica e l'Industria*, v. 39, no. 10, Oct. 1957, p. 825-831.

The influence of different parameters in catalyst preparation as related to the copolymer composition.

2968* (Russian.) Effect of Polymer Solution Concentration on the Sign of the Double Refraction in Flow. **Zavisimost' znaka dvoinogo lucheprelomleniia v potoke ot kontsentratsii rastvora polimera.** E. V. Frisman and E. N. Arkhipova. *Doklady Akademii Nauk SSSR*, v. 115, no. 3, July 21, 1957, p. 491-493.

Double and single refractions, anisotropy, and concentration of the polymer in the solvent.

2969* (Russian.) Complex Formation and Chain Structure During Polymerization of Divinyl With Butyl-Lithium. **Kompleksoobrazovanie istruktura tsepi pri polimerizatsii divinila litiibutilom.** V. A. Kropachev, B. A. Dolgoplosk, and N. I. Nikolaev. *Doklady Akademii Nauk SSSR*, v. 115, no. 3, July 21, 1957, p. 516-517.

2970* (Russian.) Use of Catalysts Based on Magnesium Halogen Alkyls and Titanium Tetrachloride in the Production of Amorphous and Crystalline Polymers From α-Olefines and Dienes. **Katalizatory na osnove magniigalogenalkilov i chetyrekhkhloristogo titana dlia sinteza amorfnykh i kristallicheskikh polimerov iz α-olefinov i dienov.** B. A. Dolgoplosk, L. M. Romanov, B. L. Erusalimskii, and V. Ia. Bogomol'nyi. *Doklady Akademii Nauk SSSR*, v. 115, no. 4, Aug. 1, 1957, p. 731-733.

Study of the effectiveness of the R-Mg X-$TiCl_4$ system for initiating the polymerization process, using the examples of ethylene, styrene, propylene, and isoprene polymerization.

2971 Engineering Properties and Applications of Plastics. Gilbert Ford Kinney. 278 p. 1957. John Wiley & Sons, New York. (TA455.P7 K62e)

Fabrication methods. Mechanical, electrical, optical, and thermal properties. The various plastics are described separately.

2972 Engineering Aspects of Emulsion Polymerization. Sidney J. Baum. *Industrial and Engineering Chemistry*, v. 49, Nov. 1957, p. 1797-1802.

Modifications in equipment necessary for emulsion polymerization of polymers other than rubber, including jacket designs, condenser arrangements, storing and handling tanks, shipping containers, construction materials, and safety aspects.

2973 Continuous Recycle Copolymerization. A. W. Hanson and R. L. Zimmerman. *Industrial and Engineering Chemistry*, v. 49, Nov. 1957, p. 1803-1806.

A method of vinyl copolymerization which gives copolymers of homogeneous and predictable composition at a relatively high percentage of solids was achieved by continuous polymerization in a well-stirred reactor, devolatilization of a partially polymerized solution, and recycling of the recovered monomer directly to the reactor.

2974 Dewatering of Thermoplastic Resins by Syneresis. P. M. Lindstedt and H. L. Gunnerson. *Industrial and Engineering Chemistry*, v. 49, Nov. 1957, p. 1823-1827.

Up to 80% of the moisture in the wet filter cake of a thermoplastic resin is removed by raising the temperature to its softening point. Coalescence forces water to drain off.

2975 Degradation of Hydrophilic Cross-Linked Resins. Empirical Determination of Order of Stability of Sulfonated Styrene Copolymers. John J. Collins, Frank R. Litterio, and Richard L. Markus. *Industrial and Engineering Chemistry*, v. 49, Nov. 1957, p. 1843-1848.

2976 Mixing in Laminar-Flow Systems. W. D. Mohr, R. L. Saxton, and C. H. Jepson. *Industrial and Engineering Chemistry*, v. 49, Nov. 1957, p. 1855-1856.

A theoretical treatment guides the design of compounding processes in the plastics industry, and permits thoroughness of mixing to be related to the amount and orientation of the initial interfacial surface and net shear strain imposed.

2977 Theory of Mixing in the Single-Screw Extruder. W. D. Mohr, R. L. Saxton, and C. H. Jepson. *Industrial and Engineering Chemistry*, v. 49, Nov. 1957, p. 1857-1862.

By using equations derived to relate mixing performance to screw geometry and degree of pressure flow, mixing performance of extruder screws can be calculated and balanced against other requirements, such as output and power consumption.

2978 Solid Catalysts in Ethylene Polymerization. E. F. Peters, Alex Zletz, and B. L. Evering. *Industrial and Engineering Chemistry*, v. 49, Nov. 1957, p. 1879-1882.

Ethylene was polymerized at low pressure to highly crystalline polyethylene over nickel-charcoal and molybdena-alumina catalysts. The effects of temperature, pressure, and other variables were studied. Polymerization rate decreases with temperature and increases with pressure.

2979 Organometallics in Ethylene Polymerization. Herbert N. Friedlander and Katashi Oita. *Industrial and Engineering Chemistry*, v. 49, Nov. 1957, p. 1885-1890.

Interactions of alkyl and Ti were studied, and the effectiveness of the reaction product as a polymerization catalyst determined.

2980 2-Methyl-5-Vinylpyridine in Polyester Resin Formulations. Charles E. Wheelock. *Industrial and Engineering Chemistry*, v. 49, Nov. 1957, p. 1929-1930.

Improved fibrous glass-reinforced laminates are obtained by use of mixtures of styrene and 2-methyl-5-vinylpyridine with an unsaturated polyester.

2981 Heats of Mixing in the System Polyvinyl Acetate-Toluene. H. J. L. Schuurmans and J. J. Hermans. *Journal of Physical Chemistry*, v. 61, Nov. 1957, p. 1496-1500.

2982* Kinetics of Polymerization of Nitroethylene. II. Study of Molecular Weights (by Cryoscopic Method). D. Vofsi and A. Katchalsky. *Journal of Polymer Science*, v. 26, Nov. 1957, p. 127-139.

2983* Diffusion in Ethylene Polymers. I. Desorption Kinetics for a Thin Slab. D. W. McCall. **II. Desorption of Water.** D. W. McCall, J. F. Ambrose, and V. L. Lanza. *Journal of Polymer Science*, v. 26, Nov. 1957, p. 151-169.

2984* Molecular Motion in Polyethylene. D. W. McCall and W. P. Slichter. *Journal of Polymer Science*, v. 26, Nov. 1957, p. 171-186.

A comparison of molecular motion in two representative polyethylenes, one made by ionic catalysis and one made at high pressure. Studies centered about the method of proton magnetic resonance, correlated with new or existing data from other methods, such as X-ray diffraction, dielectric relaxation, and diffusion.

2985* A Photoelectric Instrument for the Measurement of Molecular Orientation in Films of High Polymers. N. N. Winogradoff and D. C. Bisset. *Journal of Polymer Science*, v. 26, Nov. 1957, p. 187-198.

Instrument is based on photoelectric measurement of the intensity of light transmitted by two crossed rotating Polaroids when an oriented film of high polymer exhibiting optical anisotropy is placed between them. This intensity is related to the birefringences of the sample for light vibrating in three mutually perpendicular directions.

2986* Anomalous Viscosity Behavior of Polymer Solutions at Very Low Concentrations. Tōru Kawai and Kazuhisa Saito. *Journal of Polymer Science*, v. 26, Nov. 1957, p. 213-226.

An expansion of the polymer coils with dilution may play a significant role in the anomaly.

2987* The Temperature Dependence of Monomer Reactivity Ratios in Copolymerization. R. M. Joshi and S. L. Kapur. *Journal of Scientific & Industrial Research*, v. 16, sec. B, Sept. 1957, p. 379-384.

A new statistical procedure was used for computing reactivity ratios at different temperatures in the methyl methacrylate + acrylonitrile and methyl acrylate + allyl chloride systems. The temperature dependence thus determined indicates a major influence of the activation energies in guiding the trend of the competitive propagation steps.

2988* (Russian.) Improving the Method of Preparing Copolymers of Divinyl With Nitryl Acrylate. **Usovershenstvovanie sposoba polucheniia sopolimerov divinila s nitrilom akrilovoi kisloty.** V. Ia. Andakushkin, A. I. Savel'ev, and E. F. Gorneva. *Kauchuk i Rezina*, v. 16, no. 8, Aug. 1957, p. 5-9.

The effect of different amino compounds on the polymerization of divinyl with nitryl acrylate in the presence of potassium persulfate.

2989* (Russian.) The Effect of Plasticizing Agents on the Hydrogen Permeability of Polyvinyl Chloride. **O vliianii plastifitsiruiushchikh dobavok na vodorodopronitsaemost' polivinilkhlorida.** S. I. Sokolov, S. A. Reitlinger, and R. I. Fel'dman. *Kolloidyni Zhurnal*, v. 19, no. 5, Sept.-Oct. 1957, p. 624-628.

The plasticizer affects the permeability of polymer films differently depending upon the state of the polymer (vitreous, highly elastic, or viscous flow). Greatest increase in permeability was observed for the elastic state.

2990 Properties and Applications of Modified Styrene Plastics. Bennett Nathanson. *Machine Design*, v. 29, Nov. 14, 1957, p. 163-166.

2991* Factors Affecting Quality in Polyethylene Extrusion. B. H. Maddock. *Plastics Industry*, v. 15, Nov. 1957, p. 16-27.

Effects of pressure and screw speed, temperature, and design.

2992 Polythene. The Technology and Uses of Ethylene Polymers. A. Renfrew and Phillip Morgan, editors. 567 p. 1957. Interscience Publishers, New York. (TP986.P6 R29p)

Manufacture and properties; processing techniques; applications and prospects.

2993* (Spanish.) Structure and Reactivity in Reaction of Polymerization by Radicals. **Estructura y reactividad en reacciones de polimerización por radicales.** G. Martín Guzman. *Revista de Ciencia Aplicada*, v. 11, no. 57, July-Aug. 1957, p. 289-300.

Basic conditions for the existence of molecular resonance. Reactivity of the free radicals and of the monomers. Analysis of the steric effects. Limiting copolymerization types; tendency of the monomers to alternate in forming the copolymer.

2994* Synthetic Fibre Reinforced Thermosetting Resins. John G. Green, Jr. and George W. Mays. *Rubber and Plastics Age*, v. 38, Oct. 1957, p. 861 + 3 pages.

Properties and applications with particular attention to the improved abrasion resistance obtained with laminates incorporating synthetic fibers such as nylon, Dacron, and Orlon.

2995* The Resistance of Glass Fiber Reinforced Laminates to Weathering. Lucius Gilman. *SPE Journal*, v. 13, Nov. 1957, p. 33-38.

A review of data from three-year tests.

2996* Thermocouple Location and Watt Density in Injection Molding Heating Chambers. Robert Dahl and Robert McKee. *SPE Journal*, v. 13, Nov. 1957, p. 42-45.

2997* Shrink Tests Developed for Tool Plastic. Orville D. Lascoe. *Tool Engineer*, v. 39, Nov. 1957, p. 117-121.

Two practical tests for determining the shrinkage characteristics of unfilled epoxy resin.

2998 The Oxidative Degradation of Deutero-Polystyrenes. Harold C. Beachell and Spero P. Nemphos. *Wright Air Development Center, Aeronautical Research Laboratory, WADC Technical Report* 56-470, July 1957, 40 p. (TL507 Un3.18w Vis.)

2999 Investigation of the Effects of Glass Fabric Geometry on the Strength Properties of Low Pressure Glass Fabric Base Structural Laminates. W. R. Bowditch and E. L. Johnson. *Wright Air Development Center, Materials Laboratory, WADC Technical Report* 56-270, May 1957, 71 p. (TL507 Un3.18w Vis.)

Experimental work done to develop glass fabrics which make stronger plastic laminate than those commercially available.

3000 The Oxidative Degradation of Large Molecules. Harold C. Beachell. *Wright Air Development Center, WADC Technical Report* 57-406, June 1957, 37 p. (TL507 Un3.18w Vis.)

Data on polyethylene, polystyrene, and deuteropolystyrene degradation.

3001* (Russian.) On the Nature of Spherulites in Polytrifluorochlorethylene. **O prirode sferolitov v politriftorkhloretilene.** D. D. Chegodaev, N. A. Bugorkova, A. A. Kuznetsova, and N. E. Iavzina. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 9, Sept. 1957, p. 2061-2065.

Concludes that the elementary spheres resulting from trifluorochlorethylene polymerization are crystalline spheres to the highest degree known for this polymer.

3002* (Russian.) Polymerization of Unsaturated Organo-Silicon Compounds Under Pressure. **Polimerizatsiia nepredel'nykh kremniiorganicheskikh soedinenii pod davleniem. IV.** Mono- and Di-Salanes. **Mono-i disilany.** V. V. Korshak, et al. *Zhurnal Obshchei Khimii*, v. 27, no. 9, Sept. 1957, p. 2445-2449.

The effect of different radicals on the degree of polymerization of trialkylvinylsilanes. The compounds containing ethyl and methoxyl groups have greater tendency to polymerization than compounds with other radicals.

See also: **1715** (plastic packing for cooling towers); **1723** (polymeric absorbents); **1980** (isotactic polypropylene in infra-red); **1989** (self-heating and dilatometry in polymerization); **1996** (hydrogen bonding in polymers); **2454** (hydraulic fluids for molding presses); **2585** (epoxy patterns and coreboxes); **2816** (gas bubbles in polymethyl methacrylate).

POLLUTION AND WASTES

3003 Automobile Exhaust and Smog Formation. W. L. Faith, N. A. Renzetti, and L. H. Rogers. *Air Pollution Foundation, Report No.* 21, v. 2, Oct. 1957, 103 p. (TD884 Ai71.3r Vis.)

Relationship of automobile exhaust to smog; the internal combustion engine; nature of auto exhaust; atmospheric analyses; analytical methods and testing procedures; control methods for auto exhaust; legal and enforcement problems.

3004* Recommended Methods for the Analysis of Trade Effluents. Determination of Oxygen Demand. *Analyst*, v. 82, Oct. 1957, p. 683-708.

3005 Efficiency of Scavenging Devices Used in Determining Fallout. Jan Rosinski. *Armour Research Foundation (U. S. Atomic Energy Commission)*, AECU-3486, Jan. 1957, 122 p. (UF767 U3au Contin.)

Sampling with a gummed paper collector under rainless conditions was examined quantitatively as a function of adhesiveness, exposure to ultra-violet radiation, humidity, wind velocity, and electrostatic effects.

3006* Air Pollution Control in Petroleum Refining. A. D. McRae. *Chemistry in Canada*, v. 9, Oct. 1957, p. 40-43.

Methods of reduction of odors and particulate matter.

3007* (Russian.) Effect of Aerodynamic Factors on the Efficiency of the Cottrell Filter. **Vliianie aerodinamicheskikh faktorov na effektivnost' raboty elektrofil'tra.** L. A. Rikhter. *Elektricheskie Stantsii*, v. 28, no. 10, Oct. 1957, p. 30-35.

3008 The ASHAE Air-Borne Dust Survey. K. T. Whitby, A. B. Algren, R. C. Jordan, and J. C. Annis. *Heating, Piping & Air Conditioning*, v. 29, Nov. 1957, p. 185-192.

Dust properties determined were: concentration of fibrous and fine particles, stain concentration, particle size distribution, particle density, porosity of packed sediment, and dust fall.

3009* Instruments for Measuring Small Quantities of Sulphur Dioxide in the Atmosphere. W. G. Cummings and M. W. Redfearn. *Institute of Fuel, Journal*, v. 30, Nov. 1957, p. 628-635 + 2 plates.

Automatic recorder and portable meter are sensitive to one part SO_2 in 100 million parts of air over the range 0-50 p.p.h.m.

3010* (German.) Absorption and Dispersion of Light in Iron Oxide Aerosols. **Absorption und Streuung von Licht an Eisenoxyd-Aerosolen.** Werner Pepperhoff and Cord Passow. *Kolloid Zeitschrift*, v. 154, Oct. 1957, p. 117-119.

Calculation, according to mixing theory, of the absorption and dispersion of Fe_3O_4 smoke produced during the production of steel in a Thomas converter. Absorption and extinction constants for smoke particles of 20 to 100 mμ. diameter.

3011* Portable Collector Traps Brass Fumes at Source. Robert Langsenkamp. *Modern Castings*, v. 32, Nov. 1957, p. 54-55.

Portable dust and fume collector solves air pollution problems in brass foundry.

3012 (Finnish.) On the Process Waters of the Chemical Wood-Working Industries. **Den kemiska träförädlingsindustrins fabrikationsvatten.** Harald Tötterman. *Teollisuuden Koskuslaboratorion Tiedonantoja* 173, 1957, p. 466-470. (Reprinted from *Papperoch Trä*, no. 9, 1956.) (TS1080 C33m Contin.)

An analysis, largely based on studies of relevant literature, of requirements for the water used in the manufacture of pulp, paper, and rayon.

3013 Status Report on Handling and Disposal of Radioactive Wastes in the AEC Program. *U. S. Atomic Energy Commission*, WASH-742, Aug. 1957, 41 p. (UF767 Un3.1w Contin.)

3014* Photometric Determination of Color and Turbidity of Water. A. T. Palin. *Water & Sewage Works*, v. 104, Nov. 1957, p. 492-495.

See also: **2373** (measurement of auto-exhaust hydrocarbons).

RUBBER AND ELASTOMERS

3015* (Russian.) Investigation of the Molecular Chain Structure of Polyisoprenes by Means of Infra-Red Spectra. **Issledovanie struktury molekuliarnykh tsepei poliizoprenov po infrakrasnym spektram pogloshcheniia.** K. V. Nel'son and I. Ia. Poddubnyi. *Doklady Akademii Nauk SSSR*, v. 115, no. 3, July 21, 1957, p. 545-547.

Investigation of polyisoprenes obtained by catalytic polymerization and which are close to natural rubber in physical-mechanical properties. Emulsified polyisoprenes obtained under effect of free radicals were also studied.

3016 Concentrating GR-S Latex by a Continuous Column. R. C. Stell, J. C. Blackwell, and P. J. Henry. *Industrial and Engineering Chemistry*, v. 49, Nov. 1957, p. 1835-1837.

3017 Syntheses of Butadiene-Styrene Elastomers and of Polysulfones by Gamma Radiation. H. Moeremans d'Emaus, Bruce G. Bray, Joseph J. Martin, and Leigh C. Anderson. *Industrial and Engineering Chemistry*, v. 49, Nov. 1957, p. 1891-1896.

The effect of γ radiation on the copolymerization of butadiene and styrene and of SO_2 with various unsaturated hydrocarbons was investigated using Co-60 sources.

3018* (Russian.) Structure and Properties of Filled Rubber Mixtures. **Struktura i svoistva napolnennykh rezinovykh smesei. XVI.** Sodium-Butadiene Rubber Mixtures Containing Colloidal Silicic Acid. **Smesi iz natrii-butadienovogo kauchuka s kolloidnoi kremnekislotoi.** B. Dogadkin, K. Pechkovskaia, and E. Gol'dman. *Kauchuk i Rezina*, v. 16, no. 8, Aug. 1957, p. 1-5.

Effect of colloidal silicic acid on structure of rubber mixtures.

3019* (German.) The Vulcanization of High-Elasticity Polymers. **Zur Kenntnis der Vulkanisation hochelastischer Polymerisate. XVII.** The Function of Oxides in Vulcanization by Compounds of the Thiuram Series. **Die Rolle der Oxyde bei der Vulkanisation durch Verbindungen der Thiuramreihe.** Walter Scheele, Horst Grasemann, and Günter Mau. *Kautschuk und Gummi*, v. 10, Oct. 1957, p. WT241-WT250.

The reaction of tetraethyl-thiuram-disulfide with zinc oxide was analyzed quantitatively, and the reduction of thiuram-disulfide as well as the increase in the content of dithiocarbaminate, were studied by means of conductometric titration and spectrophotometric analysis.

3020* (German.) The Effect of the Mixing Process on Dispersion of ISAF Blacks in Natural Rubber. **Über den Einfluss des Misch-Verfahrens auf die Dispersion von ISAF-Russen in Naturkautschuk.** H. Westlinning. *Kautschuk und Gummi*, v. 10, Oct. 1957, p. 258WT + 7 pages.

The condition of the rubber at the time of adding the filler is of utmost importance for obtaining a good dispersion of ISAF blacks.

3021* (Russian.) Butadiene-Styrene Resins as Reinforcers of Rubber Compounds. **Butadien-stirol'nye smolyusiliteli rezinvvykh smesei.** V. G. Epshtein, et al. *Khimicheskaia Promyshlennost'*, 1957, no. 5, July-Aug., p. 261-265.

Butadiene-styrene resins with 85 to 95% styrene have been successfully used as reinforcers for rubber compounds. Resin

doses up to 30 wt.% per 100 wt.% of SKS-30-rubber made it possible to obtain a soft resin, with high qualitative indexes.

3022* (Russian.) The Effect of Molecular Interaction on the Properties of Rubber Solutions. **K. voprosu o vliianii mezhmolekuliarnogo vzaimodeistviia na svoistva rastvorov kauchukov.** V. E. Gul' and V. A. Berestnev. *Kolloidnyi Zhurnal*, v. 19, no. 5, Sept.-Oct. 1957, p. 552-555.

Data on the viscosity of solutions and on the equilibrium swelling of divinyl nitrile acryl rubbers.

3023* (Russian.) The Dependence of the Viscosity of Butadiene-Styrene Rubbers on Their Structure. **Zavisimost' viazkosti butadienstirol'nykh kauchukov ot struktury.** A. S. Novikov and F. S. Tolstukhina. *Kolloidnyi Zhurnal*, v. 19, no. 5, Sept.-Oct. 1957, p. 599-606.

The viscosity of a melt of the copolymers SKS-30 and SKS-30A was investigated as a function of the temperature and the molecular structure (molecular weight and extent of branching). Fractions of SKS-30 of a more widely-branched structure have less viscosity in the solid phase and in benzene solution than fractions of SKS-30A of the same molecular weight.

3024 Radiation Makes Better, Longer-Lasting Tires. Charles H. Stockman, Dale J. Harmon, and Harry F. Neff. *Nucleonics*, v. 15, Nov. 1957, p. 94-97.

Although not yet commercially feasible, radiation vulcanized tires age as well as conventional tires and may wear longer and better.

3025* (German.) Temperature Relationship Between Plastic-Elastic Behavior of Natural Rubber and Audio Frequencies. **Temperaturabhängigkeit des plastisch-elastischen Verhaltens von Naturkautschuk bei Schallfrequenzen.** P. Jung. *Plaste und Kautschuk*, v. 4, no. 9, Sept. 1957, p. 343-346.

Velocity and absorption of sound by rubber fibers at 1000 c.p.s. in the temperature range from 20 to 85 C.

3026 New Rubber Beats Heat—High-Temperature Butyl. G. S. Buettner and C. R. McGill. *Product Engineering*, v. 28, Nov. 11, 1957, p. 90-91.

First design data on new material that retains strength and flexibility up to 350 F. The rubber is compared with five similar elastomers.

3027* (French.) Recent Improvements in Butyl Rubber Processing. **Progrès récents dans la mise en oeuvre du butyl-caoutchouc.** G. Loosfelt. *Revue Générale du Caoutchouc*, v. 34, no. 9, Sept. 1957, p. 878-890.

A summary on the use of butyl polymers in tires.

3028* (French.) Change in Electric Properties of Natural Rubber/Carbon Black Compounds During Press Vulcanization. **Évolution des propriétés électriques des mélanges de caoutchouc naturel et de noir de carbone pendant la vulcanisation sous presse.** H. Desanges, R. Chasset, and P. Thirion. *Revue Générale du Caoutchouc*, v. 34, no. 9, Sept. 1957, p. 893-901.

Comparison of the behavior of vulcanizable and non-vulcanizable compounds.

3029* (English.) **Rubber and Clay Masterbatches. I. Description and Preparation.** G. Giger and M. Liponski. *Revue Générale du Caoutchouc*, v. 34, no. 9, Sept. 1957, p. 927-931.

3030 A Comparision of Instruments Used to Determine the Suitability of Elastomers for Low Temperature Service. II. Stress Decay. M. Hanok, J. Z. Lichtman, C. K. Chatten, and G. Adler. *Rubber Age*, v. 82, Nov. 1957, p. 275-285.

3031 Recent Developments in Compounding Kel-F Elastomers. Lester E. Robb, Francis J. Honn, and David R. Wolf. *Rubber Age*, v. 82, Nov. 1957, p. 286-290.

Report on a practical polyamine cure utilizing HMDA-Carbamate and use of a high melting fluorocarbon wax as a processing aid.

3032* Effect of *cis-trans* Ratio on the Physical Properties of 1,4-Polybutadienes. Gerard Kraus, J. N. Short, and Vernon Thornton. *Rubber and Plastics* Age, v. 38, Oct. 1957, p. 880 + 7 pages.

Physical properties of both gum and tread vulcanizates of 1, 4-polybutadienes show that marked changes in properties occur as the structure of the polymer approaches either pure *cis* or pure *trans* configuration, with only minor changes in the range of from 25 to 80% *cis*.

3033* Relationship of Polymer Structure to the Properties of Butyl Rubber Vulcanisates. W. L. Dunkel, W. C. Smith, and R. L. Zapp. *Rubber and Plastics Age*, v. 38, Oct. 1957, p. 892 + 5 pages.

Because of low unsaturation, butyl vulcanizates are highly resistant to attack by oxidizing media and exhibit high resistance to heat degradation. The linear nature of the polymer is responsible for its low gas permeability and good damping qualities.

3034* Viton A—Effect of Fillers on Heat and Fluid Resistance. A. L. Moran. *Rubber World*, v. 137, Nov. 1957, p. 250 + 5 pages.

All the fillers and reinforcing agents studied increased modulus, reduced elongation, and increased hardness of vulcanizates.

3035* Mechanical Separation of Fiber in Rubber Reclaiming. Robert M. Boyles and D. J. Sullivan. *Rubber World*, v. 137, Nov. 1957, p. 256-258.

By separating the fiber from scrap rubber mechanically instead of chemically in a new reclaiming process, a salable by-product results.

3036* (Russian.) Thermoelastic Phenomena in Natural Rubbers During Cyclic Deformation. **Termouprugie iavleniia v rezinakh iz natural'nogo kauchuka pri tsiklicheskom deformirovanii.** M. P. Votinov, L. L. Sul'zhenko, and E. V. Kuvshinskii. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 10, Oct. 1957, p. 2307-2313.

Study of properties during adiabatic tension-contraction cycles shows that, during the first stage of tension, the generation of heat is equivalent to the work of tension. Further deformation leads to reversible generation of surplus heat, associated with crystallization.

See also: **2420** (friction in rubber bearings); **2421** (friction of rubber).

SPACE HEATING AND CONDITIONING

3037 Non-Chemical Factors Affecting Inhibitor Selection and Performance in Air Conditioning Cooling Waters. Sidney Sussman. *Corrosion*, v. 13, Nov. 1957, p. 701t-710t.

Economic, mechanical, human, and legal factors.

3038* Design of Fins for Cooling of Semiconductors. Werner Luft. *Electrical Manufacturing*, v. 60, Nov. 1957, p. 98-103.

Numerical examples and time-saving nomograms are included to support the general equations presented.

3039* (French.) A Study of Solar Rays as a Contribution to the Heating of Residential Buildings. **Étude du rayonnement solaire, comme appoint au chauffage des bâtiments habités.** Jean Dumortier. *Flamme et Thermique*, v. 10, no. 108, Sept. 1957, p. 11 + 20 pages.

Effects of solar radiation; value of the heat flux absorbed by a wall. Effects of angle of incidence of the wall and geometrical and astronomic factors.

3040 Guide Specifications for Typical Low-Pressure Commercial Heating Plant, 20,000 EDR or 4,800,000 Btu per hr., Adaptable to Design Loads: 3,000 to 24,000 EDR, 750,000 to 5,500,000 Btu per hr. 58 p. 1957. Bituminous Coal Institute, Washington, D. C. (TH7570 B54g Over.)

Specifications and recommendations for design of coal-fired boiler installation.

3041 Performance of a Solar Heated Office Building. F. H. Bridgers, D. D. Paxton, and R. W. Haines. *Heating, Piping & Air Conditioning*, v. 29, Nov. 1957, p. 165-170.

3042 A High-Flux Low-Temperature Solar Collector. R. G. Nevins and P. E. McNall, Jr. *Heating, Piping & Air Conditioning*, v. 29, Nov. 1957, p. 171-176.

Collection efficiencies of 65 to 75% were obtained using a 6-in. diam. collector mounted in a 5-ft diam. surplus searchlight on clear days with collector temperatures from 100 to 170 F and air temperatures of approximately 80 F.

3043* Behavior of Refrigerants 12 and 22 in Sealed-Tube Tests. D. E. Kvalnes and H. M. Parmelee. *Refrigerating Engineering*, v. 65, Nov. 1957, p. 40 + 4 pages.

Tests with $CClF_2$ and $CHClF_2$.

3044* (Norwegian.) The Ventilation of Public Shelters in an A- or H-Bomb War. **Ventilasjon av offentlige tilflukstrom i en A- eller H-bombekrig.** Jan Bille. *Teknisk Ukeblad*, v. 104, no. 39, Oct. 24, 1957, p. 875-876.

Protection against radiation heat and air pressure. Nature and duration of radioactive fall-out. Minimum necessary conditioning of shelters as regards carbonic acid content, dampness, and temperature. Air cooling and filtering.

TEXTILES, FIBERS, LEATHER, AND PAPER

3045* The Dyeing of Wool, Hair and Polyamide Fibers With Metal Complex Dyes. Ernst Schoenpflug. *American Dyestuff Reporter*, v. 46, Nov. 18, 1957, p. 851-858.

3046* The Effects of Fungicides on Deterioration of Leather. Sverre Dahl. *American Leather Chemists Association, Journal*, v. 52, Nov. 1957, p. 611-621.

The stability of chlorine-containing fungicides was studied by observing the amounts of Cl^- released in a benzene-HNO_3 mixture at 80 C. Organically bound Cu, Cl, or chloride ions are less harmful to leather than Cu or Fe ions.

3047* Leather-Finish-Adhesion Test Victor G. Vely, Nicholas D. Gallagher, and Maynard B. Neher. *American Leather Chemists Association, Journal*, v. 52, Nov. 1957, p. 622-633.

Three new heat-setting adhesives have been found which greatly widen the scope of the finish-adhesion test. A mixture of polyamides is applicable to nearly all shoe upper leathers. A vinyl chloride copolymer adheres to lacquer and upholstery leather finishes. The third new adhesive is an epoxy-based cold-set compound which adheres to practically all shoe upper leathers without heat or special equipment.

3048* (Russian.) Some Properties of Paper Pulp in Production of Capacitor Paper. **Nekotorye svoistva bumazhnoi massy dlia izgotovleniia kondensatornoi bumagi.** N. D. Sushkova. *Bumazhnaia Promyshlennost'*, 1957, no. 9, Sept., p. 5-7.

Determination of some relationships and effects which are important in production of capacitor paper and affect its quality. Development of a method of determining milling degree of the mass. Milling conditions of paper pulp are basic factors specifying physical structure and quality of any type of paper.

3049* A Study of Some Factors Affecting the Gap-Filling Properties of Wood Adhesives. Edward Hinken and Alan A. Marra. *Forest Products Journal*, v. 7, Sept. 1957, p. 286-292.

The time-thickness reaction of a furfuryl alcohol modified urea to changes in wood moisture content and rate of cure indicated that higher moisture contents and slower rates of cure are conducive in some degree to improved gap-filling action. In comparing three adhesives it was deduced that epoxy exhibited the best behavior; furfuryl modified urea gave slightly higher strengths but with a limitation on maximum thickness and some strength loss; polyvinyl acetate emulsion gave highest over-all strength.

3050* Mechanical Properties of Red Oak Related to Drying. Robert L. Youngs. *Forest Products Journal*, v. 7, Oct. 1957, p. 315-324.

The perpendicular-to-grain mechanical properties of northern red oak were investigated in tension and in compression between 80 and 180 F and the moisture-content range 6% to green. Included were static tension and compression tests and tests to determine creep and stress relaxation characteristics. Most properties were significantly affected by heating at 180 F for 30 days.

3051* First Fluid Bed Dryer. K. R. Draw. *Modern Textiles Magazine*, v. 38, Nov. 1957, p. 39 + 1 page.

Fabrics ranging in weight from very heavy to medium have been processed successfully with radically new machine for drying and dyeing fabrics, and for heat setting resin finishes.

3052* (Russian.) Distribution of Waves in Flexible Fibers. (The Effect of Deformation Rate). **Rasprostranenie voln v gibkikh nitiakh (vliianie skorosti deformatsii).** N. Kristesku. *Prikladnaia Matematika i Mekhanika*, v. 21, no. 4, July-Aug. 1957, p. 486-490.

The distribution of transverse waves in fibers, the mechanical properties of which are described.

3053* The I.G.T. Printability Tester as an Instrument for Measuring the Adhesive Strength of Pigment Coated Papers. Glen A. Hemstock and John W. Swanson. *Tappi*, v. 40, Oct. 1957, p. 794-801.

In spite of limitations, tester can be successfully used for measuring pick strength of pigment coatings. Amount of adhesive necessary for a given pick strength is dependent primarily upon the amount of adhesive migration into raw stock that occurs during drying and degree of perfection of particle orientation within the dried coating.

3054* Analysis of Alkaline Pulping Liquors. I. Sulphur Compounds in Neutral Sulphite and Kraft White Liquors. R. B. Kesler. *Tappi*, v. 40, Oct. 1957, p. 802-809.

Method based on the use of I and hypoiodite as volumetric oxidizing agents, is presented for the determination of sulfide, sulfite, thiosulfate, and polysulfides in neutral sulfite white and kraft white liquors, and solutions of recovery furnace smelts.

3055* Short Wavelength Ultraviolet Absorption of Lignin Substances and Its Practical Application in Wood Pulping. Theodor N. Kleinert and Carlton S. Joyce. *Tappi*, v. 40, Oct. 1957, p. 813-821.

3056* A Modified Acrylamide Polymer for Improving the Dry Strength of Paper. W. F. Reynolds, et al. *Tappi*, v. 40, Oct. 1957, p. 839-846.

Resin is anionic in nature and is used in conjunction with alum under controlled pH conditions.

3057 (Finnish.) The By-Products of the Sulphate Pulp Industry and Their Use. **Sulfaattiselluloosateollisuuden sivutuotteiden käyttömahdollisuuksista.** Seppo Kahila. *Teollisuuden Keskuslaboratorion Tiedonantoja* 171, 1957, p. 457-461. (Reprinted from *Paperi ja Puu*, no. 9, 1956.) (TS1080 C33m Contin.)

Summary of a number of possibilities for processing and making use of the by-products, particularly in regard to utilization of raw tall oil and sulfate turpentine. Possible reactions of the different components and suitability of these reaction products for practical purposes.

3058 (Finnish.) On the Prospects of a Fermentation Industry Based on Wood. **Om förutsättningarna för jäsningsindustri baserad på trä.** G. O. Gadd. *Teollisuuden Keskuslaboratorion Tiedonantoja* 172, 1957, p. 462-464. (Reprinted from *Papper och Trä*, no. 9, 1956.) (TS1080 C33m Contin.)

Considers the possibilities of improvement of profit in the sulfite alcohol industry by means of fermentation of the waste liquor to which has been added sugar, hydrolyzed from wood residues. The butanol-acetone fermentation of sulfite waste liquor is discussed.

3059 (Finnish.) Physical Tools in Wood Research. **Fysikaliska hjälpmedel inom träforskningen.** B. C. Fogelberg. *Teollisuuden Keskuslaboratorion Tiedonantoja* 174, 1957, p. 471-474. (Reprinted from *Papper och Trä*, no. 9, 1956.) (TS1080 C33m Contin.)

Examples of some of the more important physical methods used in wood research are given. The use of isotopes, infra-red spectroscopy, and nuclear magnetic resonance spectroscopy are discussed.

3060 (English.) **Cupriethylenediamine and Cuprammonium Hydroxide as Solvents in Molecular Fractionation of Cellulose.** Hannes Sihtola, Ermo Kaila, and Lauri Laamanen. *Teollisuuden Keskuslaboratorion Tiedonantoja* 175, p. 809-824. (Reprinted from *Journal of Polymer Science*, v. 23, 1957, p. 809-824.) (TS1080 C33m Contin.)

A real fractionation based on different dissolving power of cuene or cuoxam solutions of different Cu concentration seems to be impossible. Fractionation takes place according to chain length when the precipitation of cellulose from a cuene solution is carried out by means of organic liquids, of which propanol is the most suitable. It can be brought about by raising the temperature of a propanol-containing cuene solution of cellulose.

3061* The Nonaqueous Carboxymethylation of Cotton. Robert M. Reinhardt, Terrence W. Fenner, and J. David Reid. *Textile Research Journal*, v. 27, Nov. 1957, p. 873-878.

Cotton fiber, thread, and fabric were impregnated with an isopropanol solution of monochloroacetic acid and refluxed with 0.3% NaOH in a mixture of methanol and isopropanol. Degrees of substitution ranging up to 0.09 were achieved. Textile properties are reported.

3062* Electroanalysis With Controlled Cathode Potential of Metallic Copper Applied to Fabrics as Metallo-Organic Fungicides. Joseph Bubernak and A. David Baskin. *Textile Research Journal*, v. 27, Nov. 1957, p. 878-882.

Electroanalysis by control of the cathode potential was applied successfully to the determination of Cu in fabrics. No interference was encountered with Sb or Fe. The sample was prepared using H_2SO_4 and $HClO_4$.

3063* (German.) The Condensation of Urea Formaldehyde Resin on Cellulose Fiber. **Die Kondensation von Harnstoff-Formaldehydkunstharz auf Cellulosegeweben.** Rudolf Loss. *Textil-Rundschau*, v. 12, Sept. 1957, p. 502-507.

Factors affecting resin condensation can be kept constant by automatically controlling the external conditions during finishing and drying, and in the condensation oven.

3064* (German.) Studies of the Improvement of the Crumpling and Expansion Capacities of Viscose Fibers. **Studien zur Verbesserung der Knitter- und Quellungseigenschaften von Viscosefasern.** Armando Geiger. *Textil-Rundschau*, v. 12, Oct. 1957, p. 560-570.

Effect of polymerization of α-methylol-vinylmethyl ketone and methylolvinylketone with viscose "fibrane" fabrics. Washing resistance. Transformations with chlorous compounds.

See also: **1618** (collagen reactivity); **1796** (analysis of lignin); **3012** (chemical woodworking process waters); **3068** (resin glues for wood); **3071** (polymeric adhesives for leather and textiles).

WELDING AND JOINING

3065* (German.) The Physical Metallurgy of Pressure Welding. **Metallphysikalische Grundlagen der Presssschweissung.** F. Erdmann-Jesnitzer. *Aluminium*, v. 33, no. 11, Nov. 1957, p. 730-739.

3066* (Russian.) Cold Welding of Wires. **Kholodnaia svarka provodov.** K. K. Khrenov and P. I. Gurskii. *Elektricheskie Stantsii*, v. 28, no. 10, Oct. 1957, p. 68-72.

Principle of welding with limited deformation. Development of tongs for cold welding of Al wires. Tongs "KC-6" produce a clean joint with accurately incised surface, which does not require additional machining. Diameter increase in weld joint does not exceed 15-20%.

3067* (German.) Modern Metal Adhesives With Special Regard to Epoxy Resins. **Moderne Metallkleber unter besonderer Berücksichtigung der Epoxydharze.** W. Schäfer. *Feingerätetechnik*, v. 6, no. 9, Sept. 1957, p. 390-393.

Specific adhesion and preliminary surface treatment. Requirements in metal adhesives. Types of adhesives. Composition, properties, applications of epoxy resins.

3068* The Dielectric Properties of Resin Glues for Wood. Donald G. Miller and T. J. S. Cole. *Forest Products Journal*, v. 7, Oct. 1957, p. 345-352.

The conductivity of a given sample of resin glue is sensitive to temperature and to its formulation, but is independent of frequency over the range of frequencies normally used in dielectric heating for wood gluing.

3069 Cladding on Carbon Steel Opens New Fields to Titanium. R. C. Bertossa. *Iron Age*, v. 180, Oct. 31, 1957, p. 59-62.

Special adaptations of vacuum-furnace brazing produce ductile, bimetallic plates in large sizes and titanium-clad carbon steel that can be formed and welded into a variety of useful shapes and structures.

3070* (Russian.) Measurement of the Power of Full Radiation of a High-Power Arc Column (Welding Type). **Izmerenie moshchnosti polnogo izlucheniia stolba dugi bol'shoi moshchnosti (tipa svarochnoi).** G. M. Tikhodeev. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1957, no. 8, Aug., p. 78-83.

Study of static characteristics of electric arcs. Determination of radiation intensity by means of semiconducting bolometer and measuring the power of full radiation of the arc column.

3071* (Russian.) Compatibility as a Main Factor in the Adhesion of High Molecular Substances. **Sovmestimost' kak osnovnoi faktor adgezii vysokomolekuliarnykh veshchestv.** V. I. Alekseenko, L. A. Bugoslavskaia, and I. U. Mishustin. *Kauchuk i Rezina*, v. 16, no. 8, Aug. 1957, p. 10-15.

Relationship between the strength of joints and composition of various adhesives for use in bonding textiles, leather, and rubber.

3072 Alloy Selection for Brazing. L. V. LaRou. *Machine Design*, v. 29, Nov. 14, 1957, p. 132-135.

Factors influencing brazing specifications in design.

3073* Something New in Joining Nonferrous Metals. *Modern Metals*, v. 13, Nov. 1957, p. 70 + 1 page.

New chemical technique for joining Al, Mg, Cu, and other nonferrous metals employs complex chloride compounds called Interact. Joints are usually stronger than base metals, and often have better corrosion resistance.

3074* (Russian.) Flash Welding of Large Section Thick-Wall Piping in a Shielding Medium. **Stykovaia svarka tolstostennykh trub bol'shogo secheniia s primeneniem zashchitnoi sredy.** N. S. Kabanov. *Svarochnoe Proizvodstvo*, 1957, no. 10, Oct., p. 1-7.

Specific features of preheating, flashings, and compression in flash weldings of large, thick-walled piping on relatively small welders. A 5-8° bevel is recommended to provide for uniform heating; glass wool pads placed inside of both ends of the welded pipes are suggested to produce a shielding atmosphere.

3075* (Russian.) Preventing Cracks in Welds on Aluminum Alloy "AMts". **Preduprezhdenie poiavleniia treshchin pri svarke aliuminievogo splava AMts.** N. D. Portnoi and N. G. Geinrikhsdorf. *Svarochnoe Proizvodstvo*, 1957, no. 10, Oct., p. 16-18.

Crackproof metal should contain not less than 25% Fe and 20% Si. Electrode coatings or flux (for submerged arc weldings) should contain enough ferrosilicon to prevent crack formation.

3076* (Russian.) Automatic Carbon Dioxide Shielded Arc Welding of Low Carbon Steel Piping in Fixed Position. **Avtomaticheskaia svarka nepovorotnykh stykov malouglerodistykh trub v srede uglekislogo gaza.** A. I. Akulov. *Svarochnoe Proizvodstvo*, 1957, no. 10, Oct., p. 25-29.

Method and technology. Equipment, electrode wire, and properties of welded joints.

3077* (Russian.) Metal Arc Welding of Magnesium Alloys. **Dugovaia svarka magnievykh splavov metallicheskim elektrodom.** V. F. Dmitriev and L. V. Biriukova. *Svarochnoe Proizvodstvo*, 1957, no. 10, Oct., p. 29-31.

Welding conditions; composition and method of applying electrode coating; results of corrosion and tensile tests.

3078* (Russian.) Welding of Pipe Lines of the Reactor of the First Atomic Electric Power Station. **Svarka tekhnologicheskikh kanalov reaktora pervoi atomnoi elektrostantsii.** V. B. Nikolaev, P. T. Dmitriev, Iu. I. Kazennov, and A. B. Kharchenko. *Svarochnoe Proizvodstvo*, 1957, no. 11, Nov., p. 42-46.

Types of welding equipment for welding of movable pipes and pipes in fixed position. Supporting rollers and power connections. Peculiarities of welding conditions and operation. Quality control, inspection, and properties of weld joints.

3079* (Russian.) Automatic Carbon Dioxide Shielded Arc Welding of Steam Turbine Diaphragm. **Artomaticheskaia svarka diafragm parovykh turbin v zashchitnoi srede uglekislogo gaza.** Z. L. Klimovitskii, L. A. Mel'nikov, and G. F. Iashutkin. *Svarochnoe Proizvodstvo,* 1957, no. 11, Nov., p. 46-49.

Equipment, advantages, and peculiarities of welding method. Properties of weld joints.

3080* (Polish.) Metal Gluing. **Klejenie metali. II.** Tadeusz Wiślicki. *Technika Lotnicza,* v. 12, no. 5, Sept.-Oct. 1957, p. 146-154.

Basic principles and methods. Apparatus used. Surface preparation of light Al alloys. Application in airplane construction.

3081* (German.) Welding With the Vacuum Technique. **Schweissen in der Vakuumtechnik. II.** Werner Espe. *Vakuum-Technik,* v. 6, Sept. 1957, p. 123-129.

Arc welding. Alternating arc between two carbon electrodes, two tungsten electrodes, or between a carbon electrode and the workpiece. Carbon arc, Ar arc, and Heliarc processes. Gas torch welding. Methods and apparatus.

3082* (Russian.) Problems in the Electric Welding of Metals. **Problemy elektrosvarki metallov.** B. E. Paton. *Vestnik Akademii Nauk SSSR,* 1957, no. 10, Oct., p. 80-85.

Discussion of the existing methods with emphasis of electroslag welding.

3083* (Russian.) Cold Butt Welding of Aluminum Wires. **Kholodnaia stykovaia svarka davleniem aliuminievykh provodov.** A. M. Rura. *Vestnik Elektropromyshlennosti,* v. 28, no. 10, Oct. 1957, p. 59-65.

Determination of required pressure and degree of deformation; surface preparation prior to welding. Procedure and equipment.

3084 A New CO_2 Welding Process. A. F. Chouinard and R. P. Monroe. *Welding Journal,* v. 36, Nov. 1957, p. 1069-1073.

High deposition rate, a visible arc, and sound weld metal are the principal advantages of automatic CO_2 welding process which makes use of a bare flux-cored electrode.

3085 Bonded Fluxes for Submerged-Arc Welding of Alloy Steels. Hallock C. Campbell and Wallace C. Johnson. *Welding Journal,* v. 36, Nov. 1957, p. 1078-1084.

Flux requiring an unusually low maturing temperature permits the controlled variation of weld chemistry through incorporation in the flux of alloying elements, deoxidizers, and strong fluxing agents.

3086 Diffusion Phenomena in Pressure Welding. A. G. Guy and A. L. Eiss. *Welding Journal,* v. 36, Nov. 1957, p. 473S-480S.

Weld interface in pressure-welded Cu-brass specimens were studied to determine the diffusion processes that occur during subsequent heating.

3087* (Czech.) A Rapid Transformation in Resistance Welding of Carbon Steels. **Prípad rýchlej transformácie pri odporovom zváraní uhlíkatých ocelí.** Ivan Hrivňák. *Zváranie,* v. 6, no. 10, Oct. 1957, p. 297-299.

An electron-microscopic study of the morphology of retransformed pearlite and some decomposition phases resulting from very rapid resistance welding of carbon steels.

See also: **2517** (corrosion of stainless steel welds); **2668** (build-up by automatic submerged arc welding); **2689** (hot crack susceptibility in Cu welds); **2782** (ultrasonic measurement of dynamic modulus of adhesive joints); **3049** (factors affecting the gap-filling properties of adhesives).

MISCELLANEOUS

3088 Going Into Politics. A Guide for Citizens. Robert E. Merriam and Rachel M. Goetz. 216 p. 1957. Harper & Brothers, New York. (JF2051 M55g)

A case study of an election campaign is followed by a description of the day-by-day operation of political parties and political action groups. The book appeals for participation in politics as both an obligation and an opportunity of the citizen in a representative democracy.

3089 A History of Technology. v. III. From the Renaissance to the Industrial Revolution, c 1500-c 1750. Charles Singer, E. J. Holmyard, A. R. Hall, and Trevor I. Williams, editors. 766 p. 1957. Oxford University Press, London. (T15 Si64h)

Historical review of progress in production of commodities, military science, communication techniques, and scientific instruments.

3090* Recency, Frequency, and Probability in Response Prediction. John E. Overall and W. Lynn Brown. *Psychological Review,* v. 64, Sept. 1957, p. 314-323.

3091 Reason and Chance in Scientific Discovery. R. Taton. 171 p. 1957. Philosophical Library, New York. (Q180.A1 T18ctr)

Examines the relative roles of active purpose and chance in the processes of scientific discovery. Includes numerous practical examples drown from the lives and works of distinguished scientists.

3092 Science in the Making. Joel H. Hildebrand. 116 p. 1957. Columbia University Press, New York. (Q171 H54s)

Explains ways by which scientists attack problems and illustrates them by detailing steps used in several researches. Concludes that scientific criteria should be applied to everyday matters of personal and public affairs.

3093 (German.) Suitability and Selection of Blast Furnace Slag for the Manufacture of Road Ballast. **Eignung und Auswahl der Hochofenschlacke für die Schotterherstellung.** Paul Hüttemann. *Stahl und Eisen,* v. 77, no. 21, Oct. 17, 1957, p. 1436-1442 + 2 plates.

Use of slag in road building. Comparison between natural rock and blast furnace slag under different conditions of testing.